Appendix E1

WSMP 2040 Meeting Presentations

Board of Directors Workshops

Water Supply Management Program 2040

Board of Directors

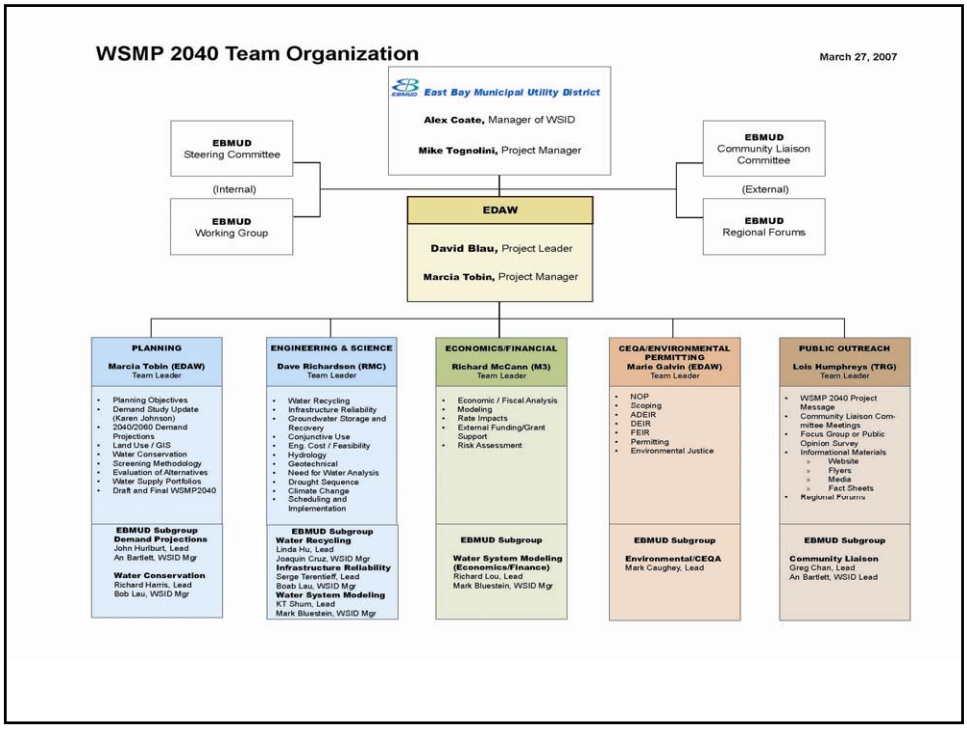
Workshop #1

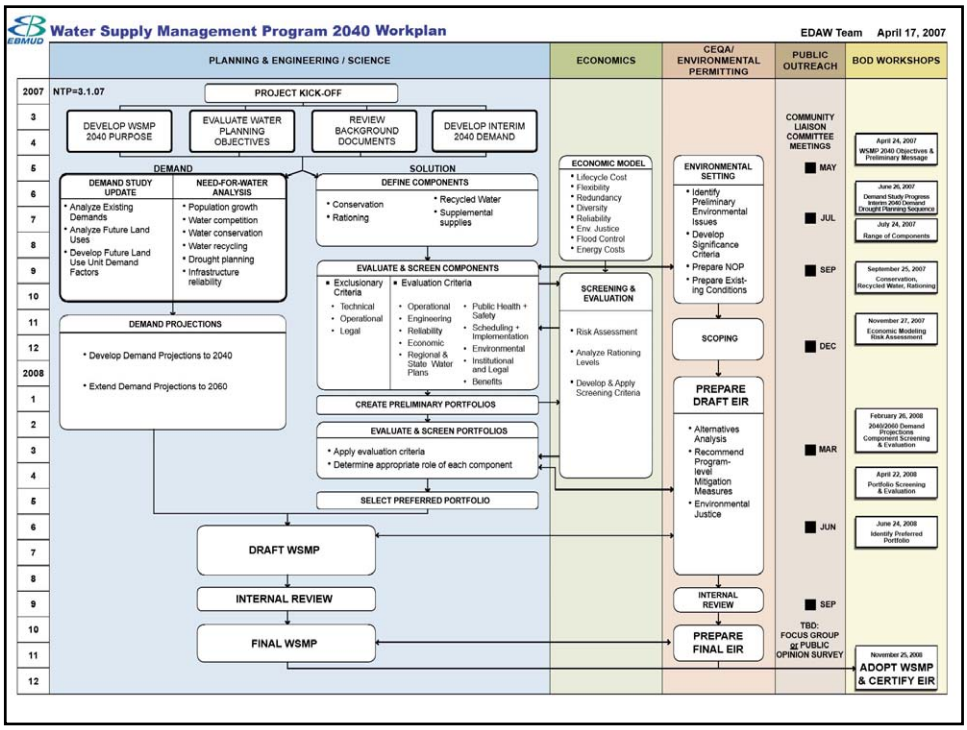
April 24, 2007

Water Supply Management Program 2040

Agenda

1. Team Organization & Workplan
2. WSMP 2020 Overview *(adopted in 1993)*
3. 1993 to Present
4. WSMP 2040 Purpose
5. Planning Objectives
6. Board Guidance & Input
7. Public Outreach Update


WSMP 2040 Team Organization
March 27, 2007
East Bay Municipal Utility District
Alex Coate, Manager of WSID
Mike Tognolini, Project Manager
EBMUD Steering Committee
(Internal)
EBMUD Working Group
EDAW
David Blau, Project Leader
Marcia Tobin, Project Manager
EBMUD Community Liaison Committee
(External)
EBMUD Regional Forums
PLANNING
Marcia Tobin (EDAW)
Team Leader
Planning Objectives
Demand Study Update (Karen Johnson)
2040/2060 Demand Projections
Land Use / GIS
Water Conservation
Screening Methodology
Evaluation of Alternatives
Water Supply Portfolios
Draft and Final WSMP2040
EBMUD Subgroup
Demand Projections
John Hurlburt, Lead
An Bartlett, WSID Mgr
Water Conservation
Richard Harris, Lead
Bob Lau, WSID Mgr
ENGINEERING & SCIENCE
Dave Richardson (RMC)
Team Leader
Water Recycling
Infrastructure Reliability
Groundwater Storage and Recovery
Conjunctive Use
Eng. Cost / Feasibility
Hydrology
Geotechnical
Need for Water Analysis
Drought Sequence
Climate Change
Scheduling and Implementation
EBMUD Subgroup
Water Recycling
Linda Hu, Lead
Joaquin Cruz, WSID Mgr
Infrastructure Reliability
Serge Terentieff, Lead
Boab Lau, WSID Mgr
Water System Modeling
KT Shum, Lead
Mark Bluestein, WSID Mgr
ECONOMICS/FINANCIAL
Richard McCann (M3)
Team Leader
Economic / Fiscal Analysis
Modeling
Rate Impacts
External Funding/Grant Support
Risk Assessment
EBMUD Subgroup
Water System Modeling (Economics/Finance)
Richard Lou, Lead
Mark Bluestein, WSID Mgr
CEQA/ENVIRONMENTAL PERMITTING
Marie Galvin (EDAW)
Team Leader
NOP
Scoping
ADEIR
DEIR
FEIR
Permitting
Environmental Justice
EBMUD Subgroup
Environmental/CEQA
Mark Caughey, Lead
PUBLIC OUTREACH
Lois Humphreys (TRG)
Team Leader
WSMP 2040 Project Message
Community Liaison Committee Meetings
Focus Group or Public Opinion Survey
Informational Materials
Website
Flyers
Media
Fact Sheets
Regional Forums
EBMUD Subgroup
Community Liaison
Greg Chan, Lead
An Bartlett, WSID Lead


Water Supply Management Program 2040 Workplan
EDAW Team April 17, 2007
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
2007
NTP=3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP INTERIM 2040 DEMAND
DEMAND
SOLUTION
DEMAND STUDY UPDATE
Analyze Existing Demands
Analyze Future Land Uses
Develop Future Land Use Unit Demand Factors
NEED-FOR-WATER ANALYSIS
Population growth
Water competition
Water conservation
Water recycling
Drought planning
Infrastructure reliability
DEFINE COMPONENTS
Conservation
Rationing
Recycled Water
Supplemental supplies
DEMAND PROJECTIONS
Develop Demand Projections to 2040
Extend Demand Projections to 2060
EVALUATE & SCREEN COMPONENTS
Exclusionary Criteria
Technical
Operational
Legal
Evaluation Criteria
Operational
Engineering
Reliability
Economic
Regional & State Water Plans
Public Health + Safety
Scheduling + Implementation
Environmental
Institutional and Legal
Benefits
CREATE PRELIMINARY PORTFOLIOS
EVALUATE & SCREEN PORTFOLIOS
Apply evaluation criteria
Determine appropriate role of each component
SELECT PREFERRED PORTFOLIO
DRAFT WSMP
INTERNAL REVIEW
FINAL WSMP
ECONOMIC MODEL
Lifecycle Cost
Flexibility
Redundancy
Diversity
Reliability
Env. Justice
Flood Control
Energy Costs
SCREENING & EVALUATION
Risk Assessment
Analyze Rationing Levels
Develop & Apply Screening Criteria
ENVIRONMENTAL SETTING
Identify Preliminary Environmental Issues
Develop Significance Criteria
Prepare NOP
Prepare Existing Conditions
SCOPING
PREPARE DRAFT EIR
Alternatives Analysis
Recommend Program-level Mitigation Measures
Environmental Justice
INTERNAL REVIEW
PREPARE FINAL EIR
COMMUNITY LIAISON COMMITTEE MEETINGS
MAY
JUL
SEP
DEC
MAR
JUN
SEP
TBD: FOCUS GROUP or PUBLIC OPINION SURVEY
April 24, 2007 WSMP 2040 Objectives & Preliminary Message
June 26, 2007 Demand Study Progress Interim 2040 Demand Drought Planning Sequence
July 24, 2007 Range of Components
September 25, 2007 Conservation, Recycled Water, Rationing
November 27, 2007 Economic Modeling Risk Assessment
February 26, 2008 2040/2060 Demand Projections Component Screening & Evaluation
April 22, 2008 Portfolio Screening & Evaluation
June 24, 2008 Identify Preferred Portfolio
November 25, 2008 ADOPT WSMP & CERTIFY EIR

EBMUD Water Supply Management Program 2040

WSMP 2020 Planning Objectives

(Adopted 1993)

Operations, Engineering, Legal and Institutional

Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges.

Economic

Minimize total direct costs to District customers

Public Health, Public Safety & Sociocultural

Maintain the high quality of the District's water supply. This includes taking steps to ensure that the District's potable water will meet all existing and anticipated drinking water standards; and that the District's non-potable water is of a quality suitable to its use.

Maintain outdoor recreation opportunities.

Minimize risks to public health and safety.

Minimize adverse sociocultural impacts

Biological

Protect and improve the biological resources that could be affected by existing District facilities or by the Composite Program

Exhibit 2 (page 1 of 5)
Screening Criteria
Operations, Engineering, Legal and Institutional Criteria

Objectives

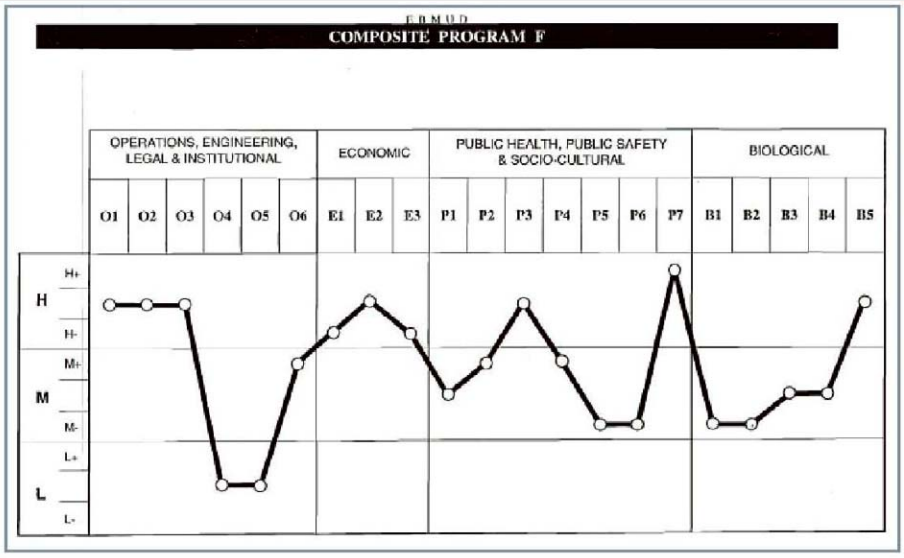
- Provide adequate capacity, flexibility and reliability to respond to the problems and challenges. (See Section 2.1)

Screening Criteria - Exclusionary Criteria

Ox1	The program components and Composite Program must be technically feasible. It must be possible to develop and operate the program components and Composite Programs based on accepted, state-of-the-art engineering considerations.
Ox2	Existing facilities and program components must not be located in an area of, or constitute, unmitigable geologic, hydrologic or toxic/hazardous materials hazards.
Ox3	The program components and Composite Program must be logistically (i.e. legally and institutionally) feasible (i.e. must be available or capable of being made available). The Composite Program must meet all existing and anticipated water rights permit and license conditions and all dam and reservoir operating permit conditions, including releases for instream uses and downstream users.
Ox4	The Composite Program must ensure that the District can handle the Drought Planning Sequence including a Maximum Drought Management Program.

Screening Criteria - Evaluating Criteria

O1	The program components and Composite Program should minimize the risk of disruptions in service by maximizing the institutional reliability of service.
O2	The program components and Composite Program should minimize the risk of disruptions in service by maximizing the technical reliability of service.
O3	The program components and Composite Program should maximize the system's operational flexibility to respond to change (including changes in water demands).
O4	The program components and Composite Program should maximize the system's implementation flexibility to respond to change (including incremental implementation or phasing of components as demands and needs change).
O5	The program components and Composite Program should minimize logistical (i.e. legal and institutional) problems.
O6	The Composite Program should minimize rationing due to drought.


E.B.M.U.D.
COMPOSITE PROGRAM F
OPERATIONS, ENGINEERING, LEGAL & INSTITUTIONAL
ECONOMIC
PUBLIC HEALTH, PUBLIC SAFETY & SOCIO-CULTURAL
BIOLOGICAL
O1 O2 O3 O4 O5 O6 E1 E2 E3 P1 P2 P3 P4 P5 P6 P7 B1 B2 B3 B4 B5
H
H+
H-
M
M+
M-
L
L+
L-

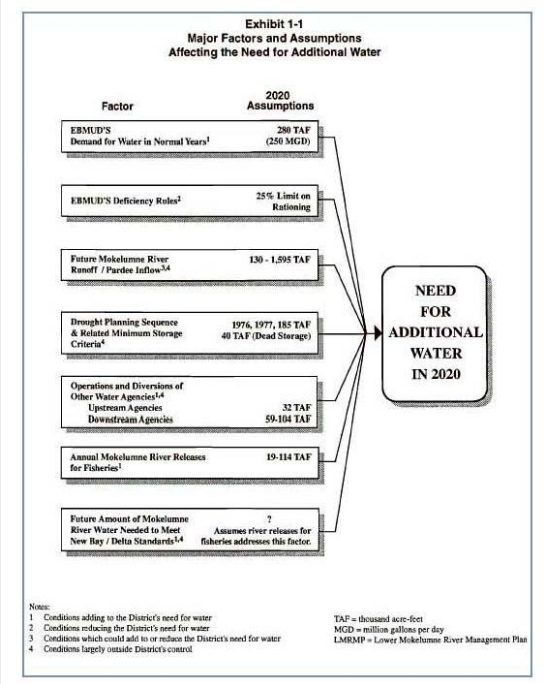
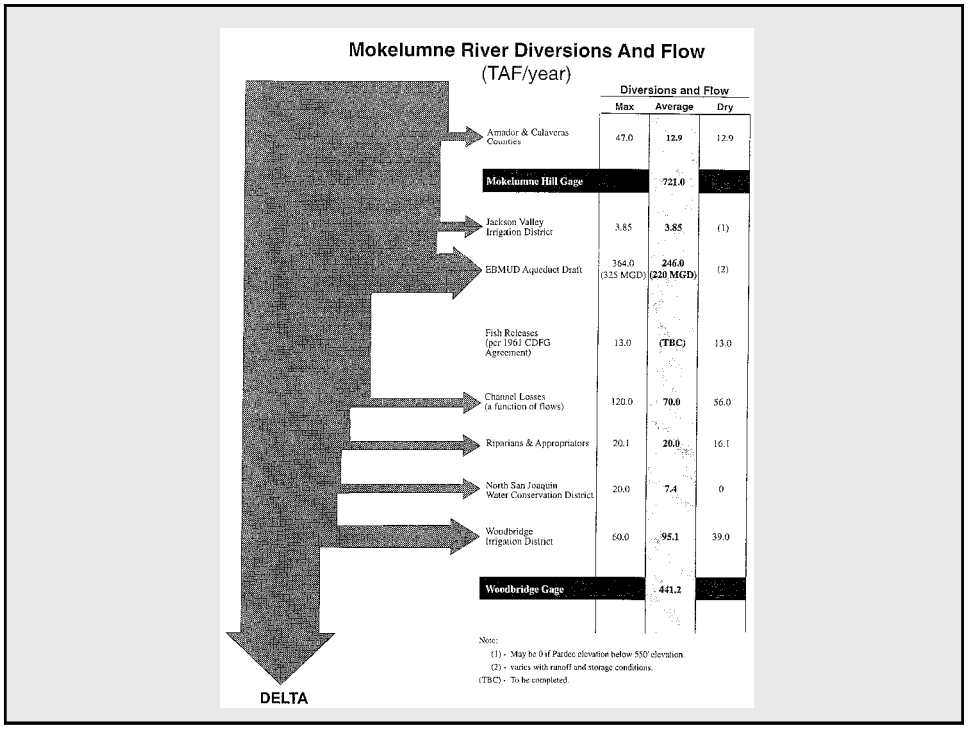


Exhibit 1-1
Major Factors and Assumptions
Affecting the Need for Additional Water
Factor
2020 Assumptions
EBMUD'S Demand for Water in Normal Years[1]
280 TAF (250 MGD)
EBMUD'S Deficiency Rules[2]
25% Limit on Rationing
Future Mokelumne River Runoff / Pardee Inflow[3,4]
130 - 1,595 TAF
Drought Planning Sequence & Related Minimum Storage Criteria[4]
1976, 1977, 185 TAF
40 TAF (Dead Storage)
Operations and Diversions of Other Water Agencies[1,4]
Upstream Agencies
32 TAF
Downstream Agencies
59-104 TAF
Annual Mokelumne River Releases for Fisheries[1]
19-114 TAF
Future Amount of Mokelumne River Water Needed to Meet New Bay / Delta Standards[3,4]
?
Assumes river releases for fisheries addresses this factor.
NEED FOR ADDITIONAL WATER IN 2020
Notes:
1 Conditions adding to the District's need for water
2 Conditions reducing the District's need for water
3 Conditions which could add to or reduce the District's need for water
4 Conditions largely outside District's control
TAF = thousand acre-feet
MGD = million gallons per day
LMRMP = Lower Mokelumne River Management Plan


Mokelumne River Diversions And Flow
(TAF/year)
Diversions and Flow
Max
Average
Dry
Amador & Calaveras Counties
47.0
12.9
12.9
Mokelumne Hill Gage
721.0
Jackson Valley Irrigation District
3.85
3.85
(1)
EBMUD Aqueduct Draft
364.0 (325 MGD)
246.0 (220 MGD)
(2)
Fish Releases (per 1961 CDFG Agreement)
13.0
(TBC)
13.0
Channel Losses (a function of flows)
120.0
70.0
56.0
Riparians & Appropriators
20.1
20.0
16.1
North San Joaquin Water Conservation District
20.0
7.4
0
Woodbridge Irrigation District
60.0
95.1
39.0
Woodbridge Gage
441.2
Note:
(1) - May be 0 if Pardee elevation below 550' elevation.
(2) - varies with runoff and storage conditions.
(TBC) - To be completed.
DELTA

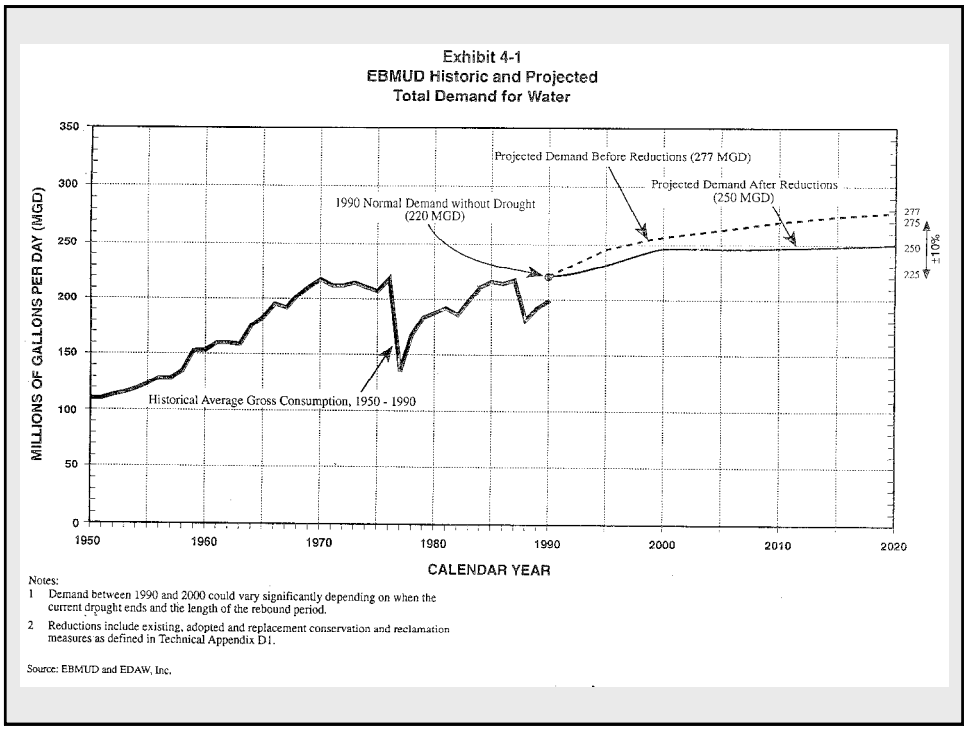
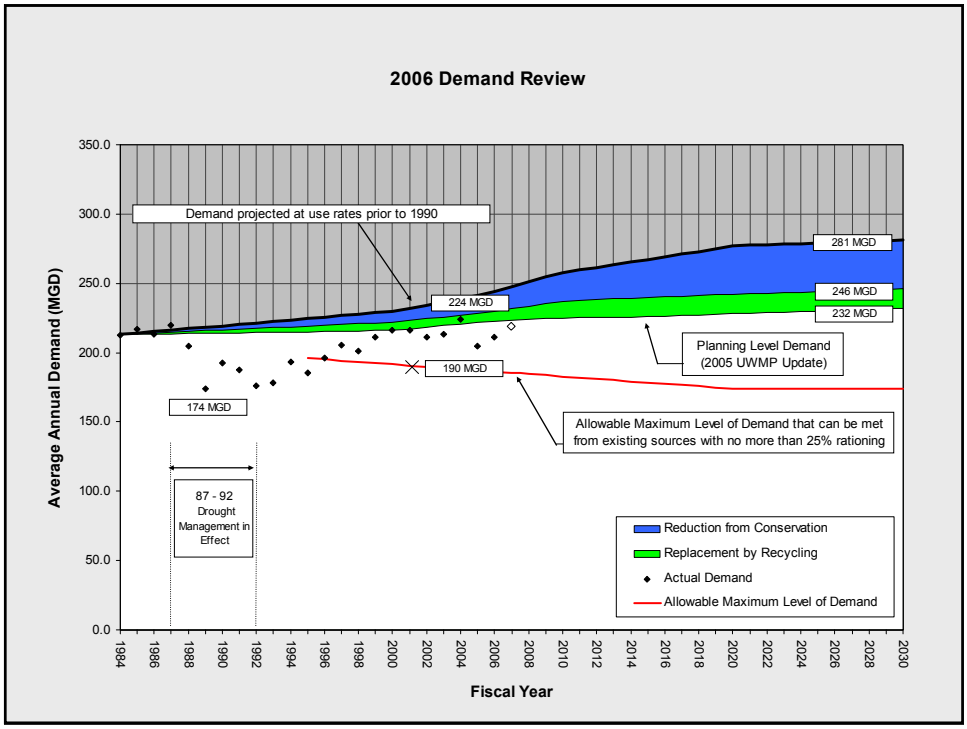


Exhibit 4-1
EBMUD Historic and Projected
Total Demand for Water
MILLIONS OF GALLONS PER DAY (MGD)
350
300
250
200
150
100
50
0
1950
1960
1970
1980
1990
2000
2010
2020
CALENDAR YEAR
Projected Demand Before Reductions (277 MGD)
Projected Demand After Reductions (250 MGD)
1990 Normal Demand without Drought (220 MGD)
Historical Average Gross Consumption, 1950 - 1990
277
275
250
225
±10%
Notes:
1 Demand between 1990 and 2000 could vary significantly depending on when the current drought ends and the length of the rebound period.
2 Reductions include existing, adopted and replacement conservation and reclamation measures as defined in Technical Appendix D1.
Source: EBMUD and EDAW, Inc.


2006 Demand Review
Average Annual Demand (MGD)
Fiscal Year
Demand projected at use rates prior to 1990
224 MGD
281 MGD
246 MGD
232 MGD
190 MGD
174 MGD
Planning Level Demand (2005 UWMP Update)
Allowable Maximum Level of Demand that can be met from existing sources with no more than 25% rationing
87 - 92 Drought Management in Effect
Reduction from Conservation
Replacement by Recycling
Actual Demand
Allowable Maximum Level of Demand

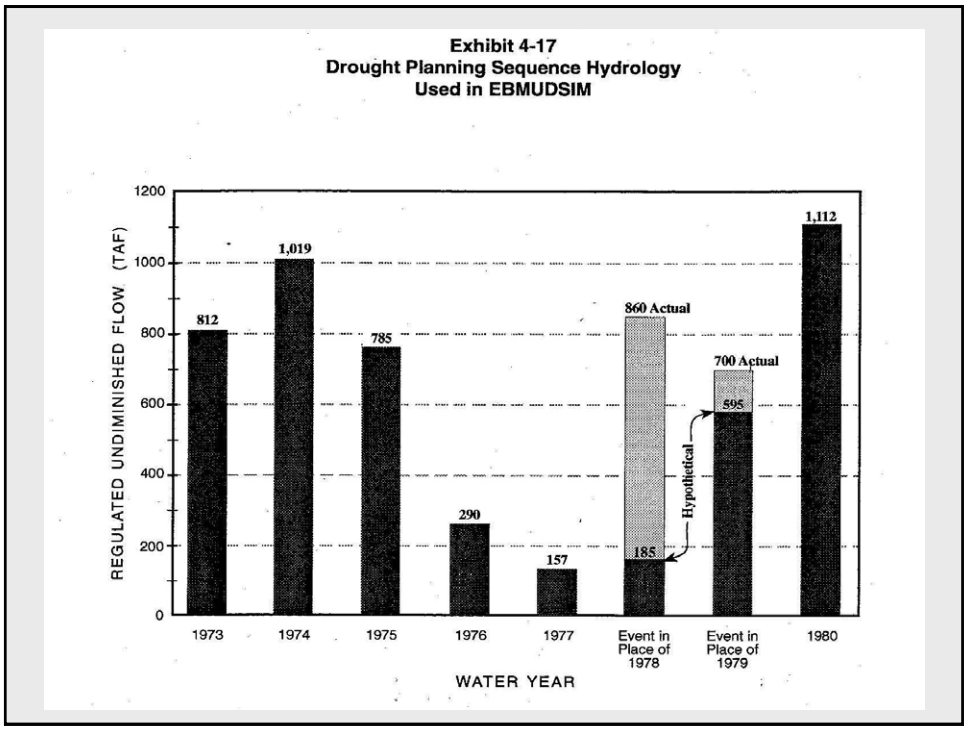


Exhibit 4-17
Drought Planning Sequence Hydrology
Used in EBMUDSIM
REGULATED UNDIMINISHED FLOW (TAF)
WATER YEAR
812
1,019
785
290
157
860 Actual
185
700 Actual
595
1,112
Hypothetical
1973
1974
1975
1976
1977
Event in Place of 1978
Event in Place of 1979
1980

Exhibit 30
Potential Primary Components for Composite Programs

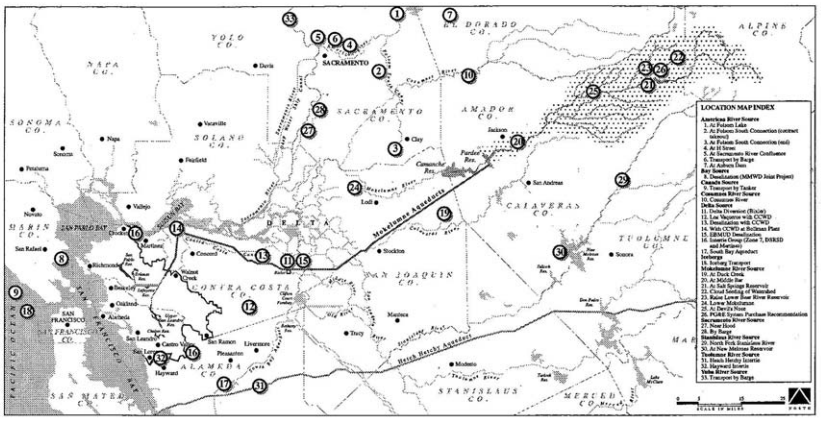
CONSERVATION	RECLAMATION	GROUNDWATER STORAGE/ CONJUNCTIVE USE	RESERVOIR STORAGE	SUPPLEMENTAL SUPPLY
Level I 7 MGD	A1 Local Non-Potable Reuse 8 MGD	Agricultural Exchange	Raise Pardee +150 TAF	Mokelumne River • Lower Mokelumne
Level II 15 MGD	A2 Local Non-Potable Reuse 21 MGD	River Substitution	Los Vaqueros +150 TAF	American River • at Folsom South Connection Contracted Take-Out Point • H Street
Level III 20 MGD	A3 Local Non-Potable Reuse 37 MGD	Direct-to-Aqueducts	Buckhorn 150 TAF	Delta • Use Existing Contract or Purchase, and Take at Bixler • Los Vaqueros 50 TAF
Level IV 35 MGD	A6 Process Demineralized Non-Potable 8 MGD			Desalination • With MMWD in the Bay • Delta Desalination at Los Vaqueros • EBMUD Delta Desalination
Level V 40 MGD	B2 Export Reuse 67 MGD			Barge • Canadian Tanker Contractor • Sacramento River
	B5 Export Reuse 76 MGD			

Source: EDAW, Inc., and EBMUD

Data Current as of 3/17/92

EBMUD UPDATED WSMP EIS/EIR

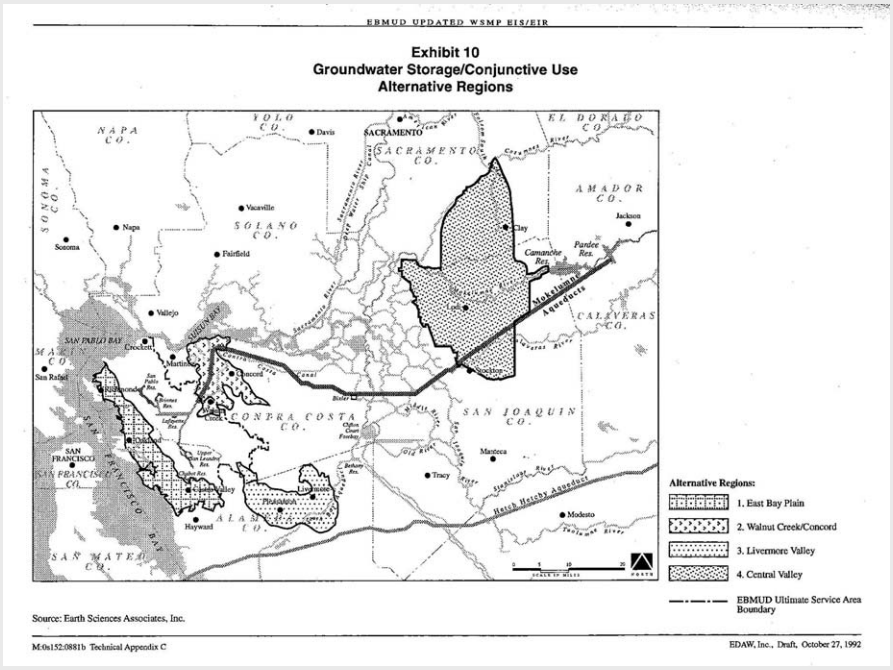
Exhibit 26
Supplemental Supply Alternative Components



Source: EDAW, Inc., ICF Kaiser Engineers, Inc., and EBMUD

M:0a152:0751c Technical Appendix C

EDAW, Inc., Draft, November 25, 1992


EBMUD UPDATED WSMP EIS/EIR
Exhibit 10
Groundwater Storage/Conjunctive Use
Alternative Regions
NAPA CO.
YOLO CO.
Davis
SACRAMENTO
SACRAMENTO CO.
EL DORADO CO.
AMADOR CO.
SONOMA CO.
Vacaville
SOLANO CO.
Napa
Sonoma
Fairfield
Clay
Jackson
Camanche Res.
Pardee Res.
Stockton Aqueducts
Vallejo
CALAVERAS CO.
SAN PABLO BAY
MARIN CO.
Crockett
Martinez
Concord
San Rafael
CONTRA COSTA CO.
SAN JOAQUIN CO.
SAN FRANCISCO
SAN FRANCISCO CO.
Oakland
Castro Valley
Livermore
Tracy
Manteca
Hetch Hetchy Aqueduct
Modesto
Hayward
ALAMEDA CO.
SAN MATEO CO.
Alternative Regions:
1. East Bay Plain
2. Walnut Creek/Concord
3. Livermore Valley
4. Central Valley
EBMUD Ultimate Service Area Boundary
Source: Earth Sciences Associates, Inc.
M:\0s152\0881b Technical Appendix C
EDAW, Inc., Draft, October 27, 1992

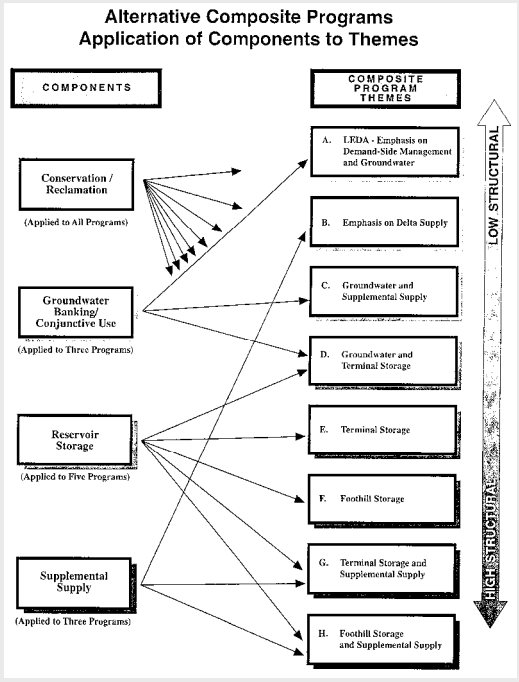

Alternative Composite Programs
Application of Components to Themes
COMPONENTS
COMPOSITE PROGRAM THEMES
Conservation / Reclamation
(Applied to All Programs)
Groundwater Banking/ Conjunctive Use
(Applied to Three Programs)
Reservoir Storage
(Applied to Five Programs)
Supplemental Supply
(Applied to Three Programs)
A. LEDA - Emphasis on Demand-Side Management and Groundwater
B. Emphasis on Delta Supply
C. Groundwater and Supplemental Supply
D. Groundwater and Terminal Storage
E. Terminal Storage
F. Foothill Storage
G. Terminal Storage and Supplemental Supply
H. Foothill Storage and Supplemental Supply
LOW STRUCTURAL
HIGH STRUCTURAL

Exhibit 1-2
Primary Composite Programs

PRIMARY COMPOSITE PROGRAMS / COMPONENTS		DMP	CONSERVATION (SAVINGS)[1]		RECLAMATION (SAVINGS)[1]			GROUNDWATER			RESERVOIR	SUPPLEMENTAL SUPPLY		Aqueduct Security	LMRMP	Composite Program Screening Designation[3]
		Maximum Deficiency[2]	II (18MGD)	IV (35MGD)	A1 (8MGD)	A2 (21MGD)	A6 (8MGD)	Agricultural Exchange	River Substitution	Direct to Aqueducts	Raise Pardee +150 TAF	Delta	Folsom South Connection			
I	Demand-Side Management	35%		●		●	●							●	●	X
II	Groundwater	25%	●		●			●	●	●				●	●	A'
III	Delta Supply	25%	●		●							●		●	●	B'
IV	Groundwater and Folsom South Connection	25%	●		●			●	●	●			●	●	●	C
V	Raise Pardee	25%	●		●						●			●	●	F
VI	Groundwater Only (Least Cost)	25%						●	●	●				●	●	J

Notes:
1 Savings indicated are in addition to savings from existing and adopted conservation and reclamation programs. Conservation and reclamation savings are not necessarily additive due to overlapping.
2 Drought Management Programs (DMP) are short-term rationing imposed on customers during droughts. A DMP would be implemented in addition to some level of conservation. .
3 During the screening of alternative composite programs, the alternatives were identified by these letters.

Source: EDAW, Inc.

Key
● Components included in Primary Composite Programs

EBMUD **Water Supply Management Program 2040**

WSMP 2020 Board Guidance & Input

1. Planning objectives
2. 2020 need for water calculation
3. Demand projections of 277 MGD
4. Drought planning sequence (76-77, modified 78)
5. 25% maximum rationing/rationing policy
6. 6 month terminal reservoir storage
7. 35 MGD conservation
8. 14 MGD recycling
9. Pursue groundwater banking & FSC
10. Strengthen Mokelumne Aqueducts
11. LMRMP

Water Supply Management Program 2040

WSMP 2020 Preferred Program

(Adopted 1993)

Aqueduct Security
An approximate 10-mile section of the Moklelumne Aqueducts through the Sacramento-San Joaquin Delta would be secured against prolonged outages resulting from earthquake-induced failures.

LMRMP
The Lower Mokelumne River Management Plan specifies flow regimes, reservoir operations, and hatchery operations that would enhance benefits to fishery resources in the Mokelumne River while maximizing flexibility in managing a variable water supply, uncertain future demands, and uncertain linkages between fish populations and fishery management activities.

Groundwater Storage/Conjunctive Use
Water would be stored in an underground basin when excess surface water supplies were available and could be withdrawn during drier years when surface supplies were below normal.

Conservation and Reclamation
These two demand-side components would reduce the District's projected 2020 demand for water from 277 MGD to 229 MGD, a reduction of 48 MGD.

Water Supply Management Program 2040

1993 to Present

Aqueduct Security
- Improvements completed (2005)

LMRMP
- FERC JSA signed (1998)

Groundwater Storage/Conjunctive Use
- MARS study (1996)
- Bayside Phase 1 Approved (2005)

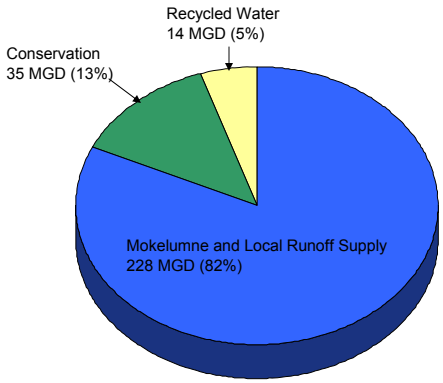
Conservation and Recycling
- Demand Management Advisory Committee (2002)
- Chevron (1996), San Ramon (2006), East Bayshore (2007)

Supplemental Supply
- WSMP Action Plan (1996)
- Freeport JPA (2002)
- Freeport EIR (2004), ROD (2005)
- Long-term CVP Contract renewal (2006)

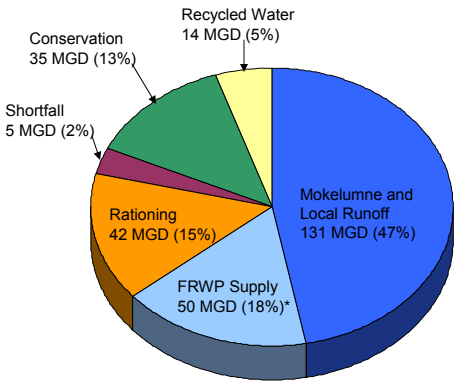
Water Supply Management Program 2040

Projected Water Supply (2020 Demand, 277 MGD)

Normal Year



Three Year Drought –
Average Year with FRWP

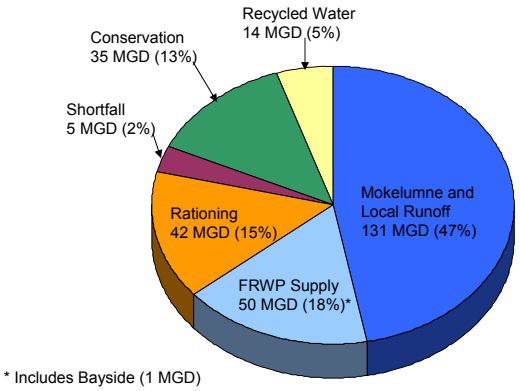


* Includes Bayside (1 MGD)

Water Supply Management Program 2040

Projected Water Supply: 2010 vs 2020

2020
277 MGD Average
Daily Demand

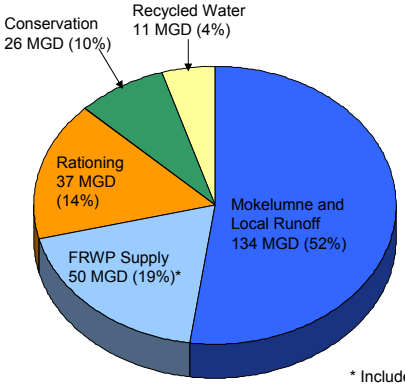


* Includes Bayside (1 MGD)

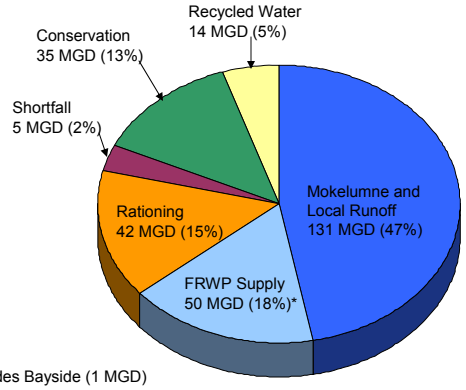
Water Supply Management Program 2040

Projected Water Supply: 2010 vs 2020

2010
258 MGD Average Daily Demand



2020
277 MGD Average Daily Demand



* Includes Bayside (1 MGD)

Water Supply Management Program 2040

WSMP 2040 Purpose

The District is midway through its 1993 WSMP and on schedule to achieve water supply reliability goals for 2020. This creates an excellent opportunity to evaluate new information and update the WSMP for another 20 years.

In doing so, the District will:

1. Account for accomplishments & changes since 1993 WSMP, including:
   - Freeport;
   - Conservation and Recycling;
   - Seismic Improvement Program;
   - Lower Mokelumne JSA;
   - Regional Interties & Forums;
   - New Regulations; and
   - Climate Change.
2. Find optimum balance between conservation, recycled water & supplemental supply.
3. Meet growing need for water.
4. Address increased competition for water.

Water Supply Management Program 2040

WSMP 2020 Planning Objectives

(Adopted 1993)

Operations, Engineering, Legal and Institutional

Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges.

Economic

Minimize total direct costs to District customers

Public Health, Public Safety & Sociocultural

Maintain the high quality of the District's water supply. This includes taking steps to ensure that the District's potable water will meet all existing and anticipated drinking water standards; and that the District's non-potable water is of a quality suitable to its use.

Maintain outdoor recreation opportunities.

Minimize risks to public health and safety.

Minimize adverse sociocultural impacts

Biological

Protect and improve the biological resources that could be affected by existing District facilities or by the Composite Program

EBMUD

Policy 3.02

EFFECTIVE 24 SEP 02

SUPERSEDES 23 JAN 06

CALIFORNIA ENVIRONMENTAL QUALITY ACT IMPLEMENTATION

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Adopt and comply with the objectives and criteria of the California Environmental Quality Act (CEQA) and CEQA Guidelines, as they are from time to time amended, and develop procedures that are consistent with District implementation of the Guidelines.

EBMUD

Policy 3.05

EFFECTIVE 14 NOV 06

SUPERSEDES 13 FEB 01

CONSIDERATIONS FOR EXTENSION OF WATER BEYOND THE ULTIMATE SERVICE BOUNDARY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT THAT:

The District will not extend water to areas outside the present Ultimate Service Boundary (USB) of the District, if such extension would result in:

1. A reduction in the quantity of water available to District customers to satisfy existing or projected levels of demand; or
2. A reduction in the quality of water available to the District customers from the District's present water sources; or
3. An increase in costs of service for District customers.

The USB defines the territory within which the District has planned to provide water service. The phrase "District customers" as used in this policy shall mean (i) existing water service customers of the District and (ii) future customers, located within the present USB, but not now receiving water service.

This policy shall not apply to proposed annexations of property to the District's service area within the USB and such annexation shall continue to be evaluated on a case by case basis.

EBMUD

Policy 3.07

EFFECTIVE 27 JUN 06

SUPERSEDES 28 SEP 04

RESPONSIBILITY TO SERVE WATER CUSTOMERS

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Ensure that during times of water shortage, available water supplies are appropriately allocated to water customers.

EBMUD

Policy 4.13

EFFECTIVE 25 JUL 06

SUPERSEDES 25 JUN 96

RATE SETTING GUIDELINES FOR WATER RATES

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT THAT:

A water rate structure that provides adequate revenues through affordable rates, encourages conservation and efficient use of water, and reflects the cost to serve customers will enhance the District's ability to provide a safe, reliable, adequate water supply to its customers over the long term.

EBMUD

Policy 6.01

EFFECTIVE 27 SEP 05

SUPERSEDES 08 JUL 03

BAY/DELTA PROTECTION

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Support the protection and enhancement of the Sacramento-San Joaquin Delta and San Francisco Bay estuary and their tributaries, including ecosystem enhancements, water quality improvement and optimized water management; support balanced implementation of the CALFED Bay-Delta Program; support the development of science based water quality standards that place a high priority on protecting the quality of drinking water supplies, consistent with the District's statutory obligations and responsibilities to those who use its water, wastewater, and other services.

EBMUD

Policy 7.05

EFFECTIVE 22 SEP 98

SUPERSEDES 13 SEP 94

ENVIRONMENTAL RESPONSIBILITY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Provide reliable, high-quality drinking water and wastewater service with operational, maintenance and construction activities that avoid, minimize or mitigate adverse environmental effects to the maximum extent feasible.

EBMUD

Policy 7.10

EFFECTIVE 25 JUL 06

SUPERSEDES 08 JUN 04

SOURCE WATER QUALITY

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Protect the public health of its customers by serving high quality water from the best available source in preference to reliance on additional treatment.

EBMUD

Policy 8.01

EFFECTIVE 14 NOV 06

SUPERSEDES 28 SEP 04

NON-POTABLE WATER

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Require that customers of the East Bay Municipal Utility District ("EBMUD") use non-potable water, including recycled water, for non-domestic purposes when it is of adequate quality and quantity, available at reasonable cost, not detrimental to public health and not injurious to plant life, fish and wildlife. When nonpotable water satisfying these conditions is made available to the customer, the use of potable water for nondomestic purposes may constitute a waste and unreasonable use of water within the meaning of Section 2 of Article X of the California Constitution and is prohibited.

EBMUD

Policy 9.03

EFFECTIVE 09 NOV 99

SUPERSEDES 09 MAY 89

WATER SUPPLY AVAILABILITY AND DEFICIENCY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Evaluate the availability of the District's water supplies (supplies of the same or similar quality to that of the Mokelumne River supply) and determine the acceptable maximum level of average annual demand for the District's service area based on limiting the water supply deficiency to a maximum of 25% during an occurrence of the drought planning sequence described in the Final Environmental Impact Report for the Updated Water Supply Management Program, September 1993.

EBMUD

Policy 9.04

EFFECTIVE 13 FEB 01

SUPERSEDES 11 AUG 98

WATERSHED MANAGEMENT AND USE

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Acquire, protect, and manage watershed land surrounding District reservoirs, in a manner which assures the District's water supply is maintained. Also, to ensure that watershed lands are maintained in accordance with the District's primary objective of providing high quality drinking water and managed in accordance with District environmental principles.

EBMUD Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional
- Provide water supply reliability.
- Preserve current water right entitlements.
- Promote regional & sustainable solutions.

Economic
- Minimize cost to District customers.
- Minimize drought impact to District customers.

Public Health, Safety & Community
- Maintain the high quality of the District's water supply.
- Minimize adverse sociocultural impacts (including environmental justice).
- Minimize risks to public health & safety.

Environmental
- Preserve & protect the environment for future generations.

Water Supply Management Program 2040

WSMP 2040 Board Guidance & Input

1. Planning objectives (today's workshop)
2. Need for water
3. Global climate change implications
4. Environmental justice
5. Infrastructure security & reliability
6. Agreement on water supply portfolios (preferred mix of conservation, rationing, recycled water, & supplemental supply)
7. Agreement on preferred water supply portfolio

Water Supply Management Program 2040

Workshop Schedule

Workshop #2	June 26, 2007	Demand Study Progress Interim 2040 Demand Drought Planning Sequence
Workshop #3	July 24, 2007	Range of Components
Workshop #4	September 25, 2007	Conservation, Recycling, Rationing
Workshop #5	November 27, 2007	Economic Modeling & Risk Assessment
Workshop #6	February 26, 2008	2040/2060 Demand Projections Component Screening & Evaluation
Workshop #7	April 22, 2008	Portfolio Screening & Evaluation
Workshop #8	June 24, 2008	Identify Preferred Portfolio
Workshop #9	November 25, 2008	Adopt WSMP & Certify EIR

Water Supply Management Program 2040

Public Outreach Update

Key Strategies

- Regular meetings with the Community Liaison Committee
- Meetings with Regional Forums as needed
- Public Opinion Survey or Focus Group
- Program EIR Public Participation

Water Supply Management Program 2040

Public Outreach Update

WSMP 2040 CLC Community Liaison Committee

First Name	Last Name	Organization
Barbara	Becnel	Richmond Neighborhood House
Charles	Brydon	W.A.T.E.R
Eleanor	Loynd	May Valley Neighborhood Assn, El Sobrante
Stuart	Flashman	Private Attorney
Merlin	Edwards	African American Chamber of Commerce
OB	Badger	Former Mayor of San Leandro
David	Nesmith	CA Environmental Water Caucus
Kris	Hunt	Contra Costa Taxpayers' Association
Laura	Harnish	Environmental Defense
Bob	Glover	Home Builders Association of N. CA.
Howard	Kerr	Oro Loma Sanitary District
John	Gioia	Contra Costa County Board of Supervisors
Henry	Gardner	Association of Bay Area Governments
Tomi	Van de Brooke	Water Task Force, Contra Costa Council
Bruce	Kern	Economic Development Alliance for Business
Betty	Graham	Dept of Health Services, SF District
Walt	Gill	Chevron Refinery
Julia	Liou	Asian Health Services
Michael	Hanneman	UC Berkeley, Water and Economics

Water Supply Management Program 2040

Public Outreach Update

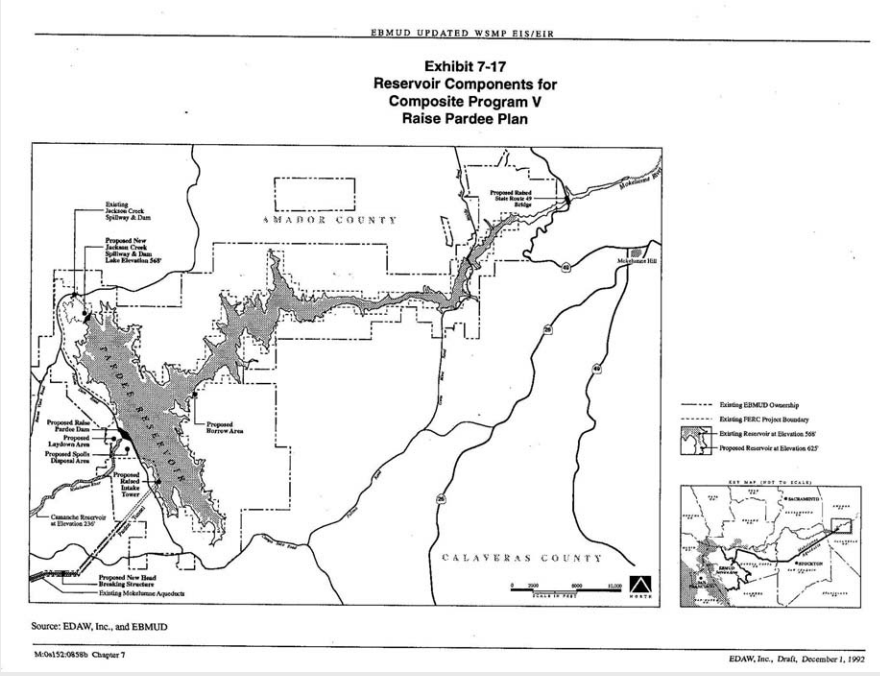
DRAFT AGENDA

Community Liaison Committee Meeting
May 1, 2007

1. Welcome & Introduce CLC members & project team members
2. Objectives of the Community Liaison Committee
3. Ground rules for participation
4. WSMP 2040 project objectives
5. Project workplan & Board of Directors workshop schedule
6. Key planning discussion
7. Schedule future CLC meetings & locations
8. Other comments or questions

Water Supply Management Program 2040

end



EBMUD Water Supply Management Program 2040

Global Climate Change

Methods

1. Altered historic hydrology (used by DWR)
2. Future climate time series (used in 2005 Governor's report)

Water Supply Management Program 2040

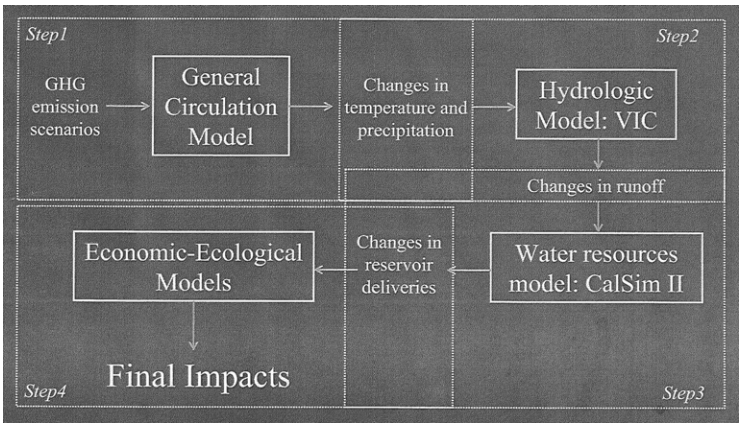
Global Climate Change

	Altered historic hydrology *(DWR method)*	Future climate time series *(Governor's report method)*
Temperature	Increase	Increase
Total Annual Precipitation	Inconclusive	Inconclusive
Annual reservoir inflow	Inconclusive	Inconclusive
Stream Flow Timing	Earlier	Earlier
Drought Persistence	Preserve historic sequence of wet and dry years	More frequent droughts, higher potential for "mega-drought"
Water Demand / Allocations	Static – based on historic	Dynamic – can change with climate change

Water Supply Management Program 2040

Global Climate Change

Applying Global Climate Model Scenarios Locally



Source: J Dracup, UC Berkeley, 2007.

EBMUD Water Supply Management Program 2040

Board of Directors Workshop #2

June 26, 2007

1

EBMUD Water Supply Management Program 2040

Agenda

1. Workplan Progress Update
2. Demands Study
   - Status Report
   - Preliminary Demand Estimate
3. Drought Planning Sequence Evaluation
4. Evaluation Criteria – Approach
5. Community Liaison Committee
   - Report on Meeting #1
   - Meeting #2: July 10, 2007

2

Water Supply Management Program 2040

WSMP 2040 Purpose

The District is midway through its 1993 WSMP and on schedule to achieve water supply reliability goals for 2020. This creates an excellent opportunity to evaluate new information and update the WSMP for another 20 years.

In doing so, the District will:

1. Account for accomplishments & changes since 1993 WSMP, including:
   - Freeport;
   - Conservation and Recycling;
   - Seismic Improvement Program;
   - Lower Mokelumne JSA;
   - Regional Interties & Forums;
   - New Regulations; and
   - Climate Change.
2. Find optimum balance between conservation, recycled water & supplemental supply.
3. Meet growing need for water.
4. Address increased competition for water.

3

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

Provide water supply reliability.
Preserve current water right entitlements.
Promote District involvement in regional, sustainable solutions.

Economic

Minimize cost to District customers.
Minimize drought impact to District customers.

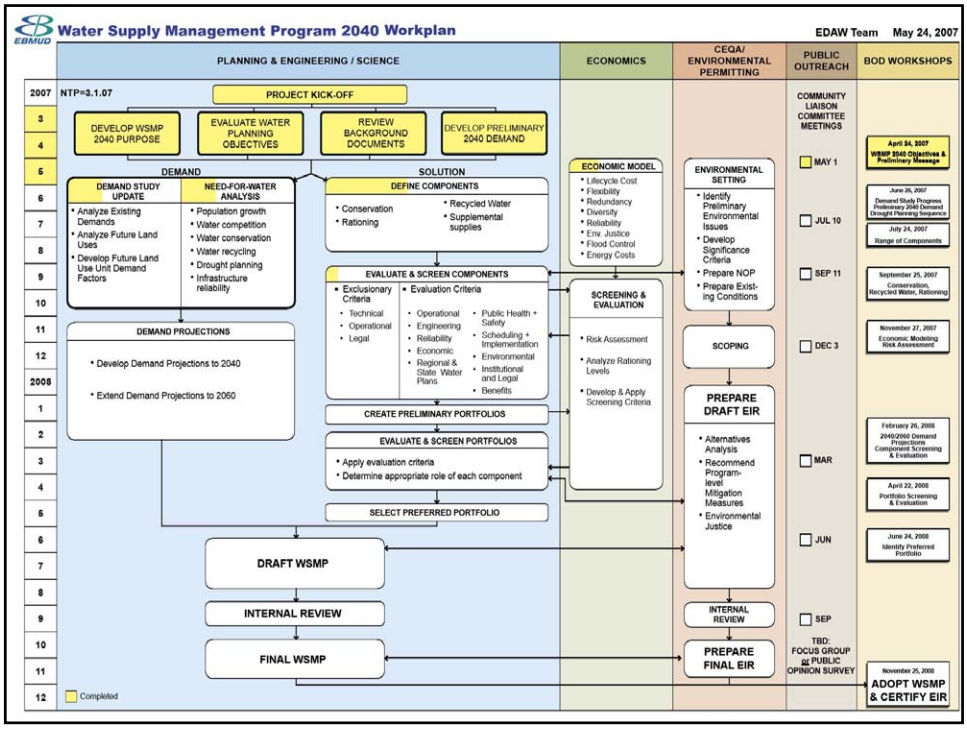
Public Health, Safety & Community

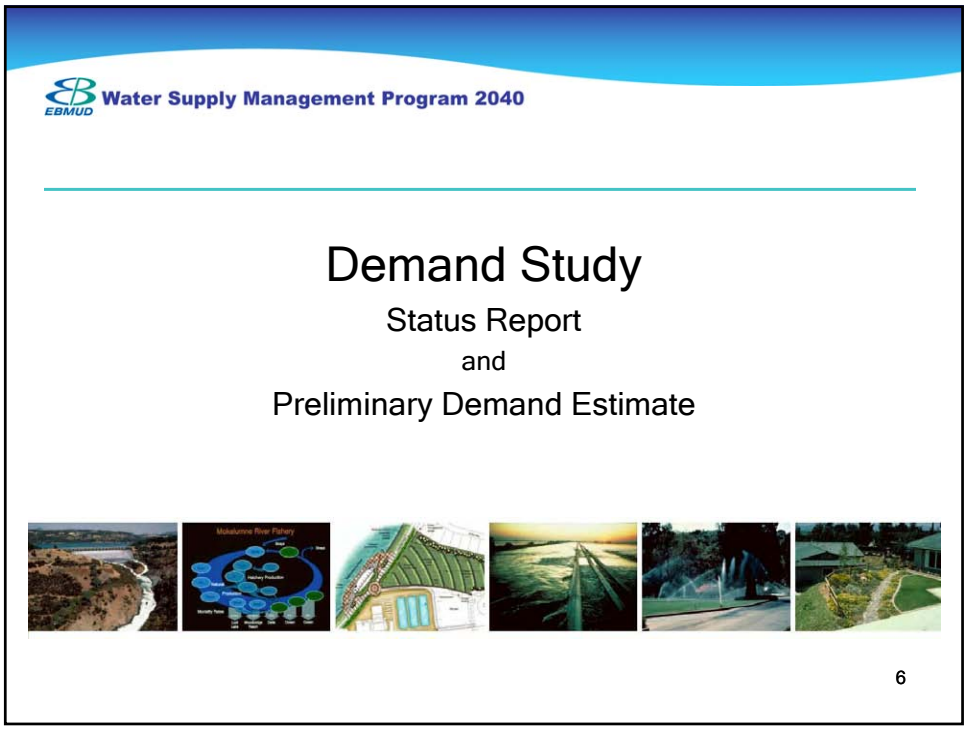
Ensure the high quality of the District's water supply.
Minimize adverse sociocultural impacts (including environmental justice).
Minimize risks to public health & safety.
Maximize security of infrastructure & water supply.

Environmental

Preserve & protect the environment for future generations.
Preserve & protect biological resources.
Contribute to reduction in carbon footprint.
Promote recreational opportunities.

4


Water Supply Management Program 2040 Workplan
EDAW Team May 24, 2007
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
NTP=3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP PRELIMINARY 2040 DEMAND
DEMAND
SOLUTION
DEMAND STUDY UPDATE
NEED-FOR-WATER ANALYSIS
DEFINE COMPONENTS
DEMAND PROJECTIONS
EVALUATE & SCREEN COMPONENTS
CREATE PRELIMINARY PORTFOLIOS
EVALUATE & SCREEN PORTFOLIOS
SELECT PREFERRED PORTFOLIO
DRAFT WSMP
INTERNAL REVIEW
FINAL WSMP
ECONOMIC MODEL
SCREENING & EVALUATION
ENVIRONMENTAL SETTING
SCOPING
PREPARE DRAFT EIR
INTERNAL REVIEW
PREPARE FINAL EIR
COMMUNITY LIAISON COMMITTEE MEETINGS
MAY 1
JUL 10
SEP 11
DEC 3
MAR
JUN
SEP
TBD: FOCUS GROUP or PUBLIC OPINION SURVEY
ADOPT WSMP & CERTIFY EIR
Completed


Water Supply Management Program 2040
Demand Study
Status Report
and
Preliminary Demand Estimate
6

Water Supply Management Program 2040

Agenda

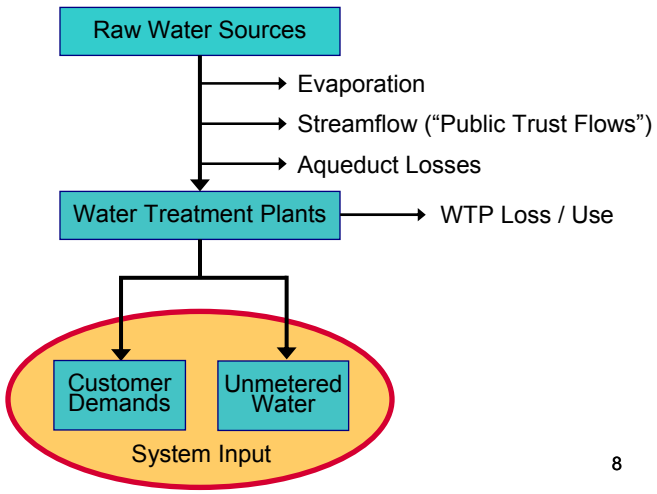
- Baseline for Demands
- Demand Estimating Methodology
- Preliminary Demand Estimate
- Demand Study Status

7

Water Supply Management Program 2040

Determine Baseline for Demands

2005 Base Year



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Water Supply Management Program 2040

Land Use Methodology Provides Most Value to District

	Land Use Method	Population Method	Socio-economic Method
Uses spatial data	✓		
Based on General Plans	✓		
Accounts for non-residential consumption	✓		✓
Assumptions undergone CEQA	✓		
Allows for disaggregation of data	✓		
Transparent methodology	✓	✓	
Data is readily available		✓	
Commonly used		✓	

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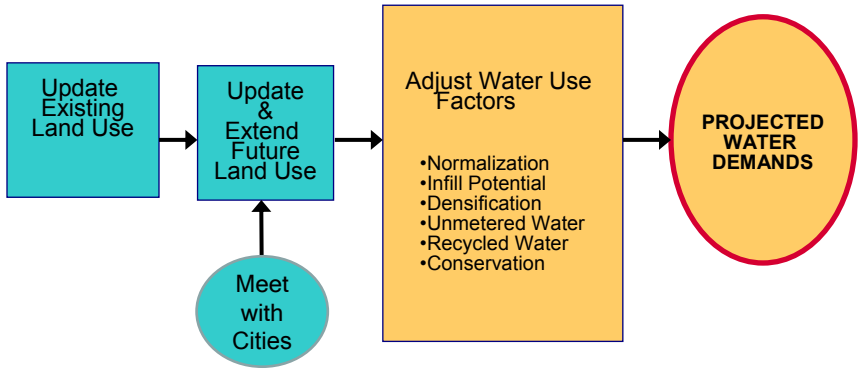
Water Supply Management Program 2040

Land Use Method



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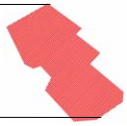
Water Supply Management Program 2040

Update Existing Land Use (2005)

Example of Use Factor:

4.9 acres x 655 gallons/day =

134 gpd/ac



- Orthographic photos (2005)
- 7,200 land use polygons in database
- Use customer metered consumption

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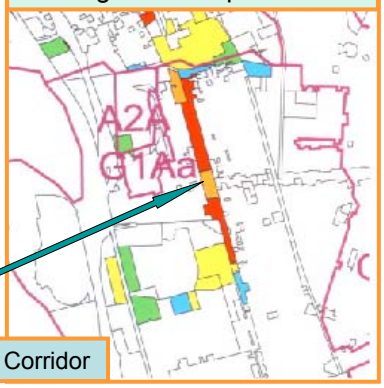
Water Supply Management Program 2040

Update & Extend Future Land Use (2040)

- Infill potential for vacant parcels
- Densification
- Timing of development

San Pablo Ave. Corridor



Water Supply Management Program 2040

Apply Slope Restrictions in Lamorinda

- Orthographic photos (2005)
- Overlay 20%+ slope layer
- Future development limited in sloped areas

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Water Supply Management Program 2040

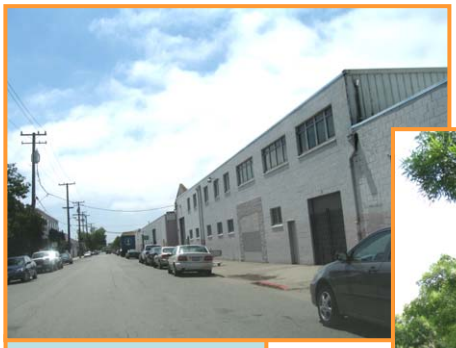
Adjust Water Use Factors

- Higher Densities
- Normalization
- Unmetered Water
- Recycled Water
- Conservation

Higher densities in the future
= Higher consumption per acre

Water Supply Management Program 2040

Adjust Water Use Factors



Underutilized Lands – Low Consumption

Higher Consumption with New Uses

Water Supply Management Program 2040

Preliminary Demand Estimate

- Used in development of portfolios
- 2005 normalized demand = 218 MGD
- 2040 demand range = 246 MGD to 270 MGD
  - 246 MGD = same level & type of development as determined in 1996
  - 270 MGD = increased level of density & development

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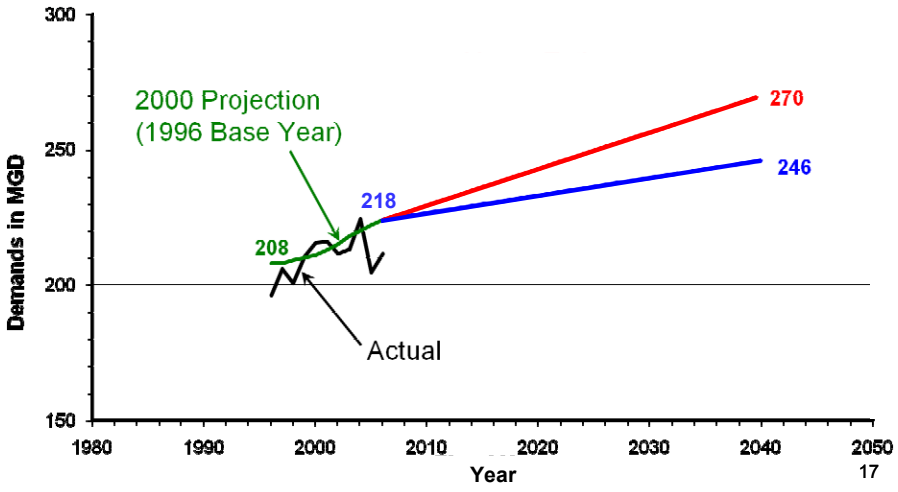
Water Supply Management Program 2040

Preliminary Demand Estimate



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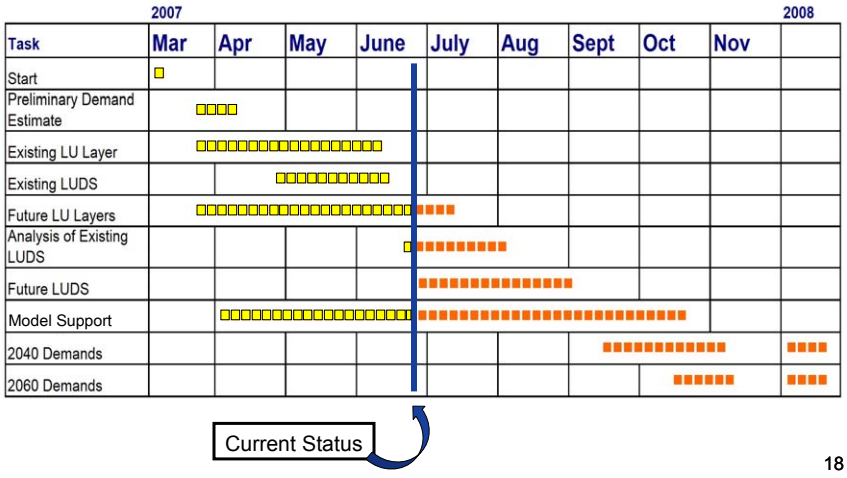
Water Supply Management Program 2040

Demand Study Status



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EBMUD Water Supply Management Program 2040

Land Use Map Demonstration

(video flythrough)

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EBMUD Water Supply Management Program 2040

Drought Planning Sequence
Evaluation

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EBMUD Water Supply Management Program 2040

Approach

- Review District's current drought planning sequence
- Review methods including tree-ring analysis and stochastic assessment
- Review methods from other water districts
- Assess carryover storage with 2040 demands

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Water Supply Management Program 2040

Background

- Existing Drought Planning Sequence (DPS) reflects the District's experience during 1976-77 drought
- 3-Year sequence: WY1978 runoff is replaced with average annual runoff from 1976-1977 (approx. 185 TAF)

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Water Supply Management Program 2040

Background

- Provides safeguard against the possibility of dry conditions continuing for a third year
- Carry-over storage fully depleted by the end of the third drought year, none held back as carry-over for a fourth dry year

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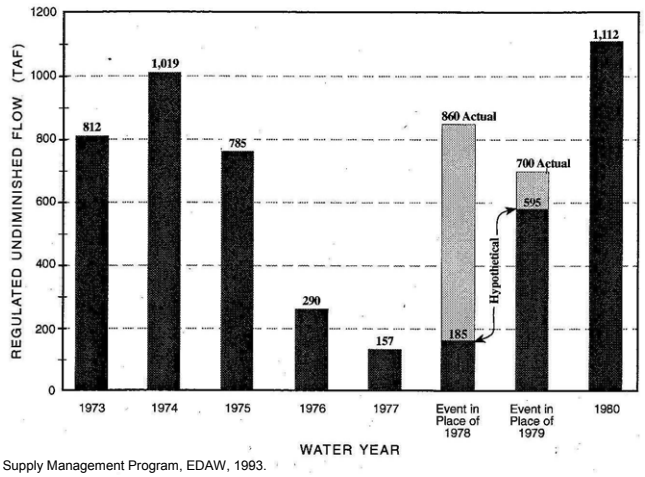
Water Supply Management Program 2040

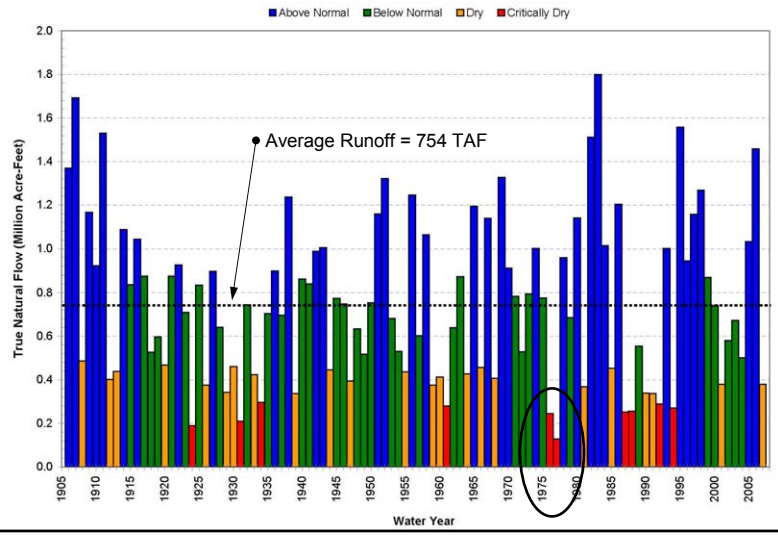
EBMUD Current DPS



Source: Updated Water Supply Management Program, EDAW, 1993.

Water Supply Management Program 2040

Mokelumne River Runoff (1906-2007)



Water Supply Management Program 2040

Comparison of Drought Planning Approaches

Agency	Basis for Drought Planning Sequence	Drought Management Triggers
EBMUD	1976-1978 (simulated 1978 = average of 76/77)	Prepare Drought Management Plan when storage is projected to be less than 500 TAF.
SCVWD	1987-1992 drought extended to a 10-year duration	Groundwater end-of-the-year carryover storage less than 350,000 af
SFPUC	1986-92 drought	No exact triggers.
CCWD	Variety of drought years and scenarios considered	No exact triggers.
Alameda CWD	IRMP model based on the period of record (1922-1992).	No triggers given.
MWD	1990-1992 drought Single dry year scenario is based on 1977	No specific triggers.
San Diego CWA	1990-1992 drought	No triggers given.
LA DPW	1959-61 drought	No triggers given.

Source: Comparison of Major Municipal and Industrial Water Agency Drought Planning Approaches, CH2MHill, 2002.

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Water Supply Management Program 2040

DPS Analyses

Tree rings

- Studies ongoing in California
- Provide historical data that pre-dates instrumentation.
- 37 datasets near Mokelumne Basin, closest are Yosemite National Park
- Two reconstructions in Sacramento Basin since 2000; none for Mokelumne Basin

Stochastic (Probabilistic) Modeling

- Use probabilistic techniques to characterize hydrology close to historical flows
- Mokelumne River flows have a short historical record
- Insufficient to capture full extent of climatic variations

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Water Supply Management Program 2040

DPS Analyses

Analysis of EBMUD data

- 1907 to 1975: 1,000-year return period for 1976-77/78
- 1907 to 1987: 200-year return period for 1976-77/78
- 1907 to 2007: 100-year return period for 1976-77/78

End of September storage (with Freeport)

- For 2020 demand (228 MGD), 1977 lowest on record at 267 TAF
- For 2040 demand (258 MGD), 1977 lowest on record at 191 TAF

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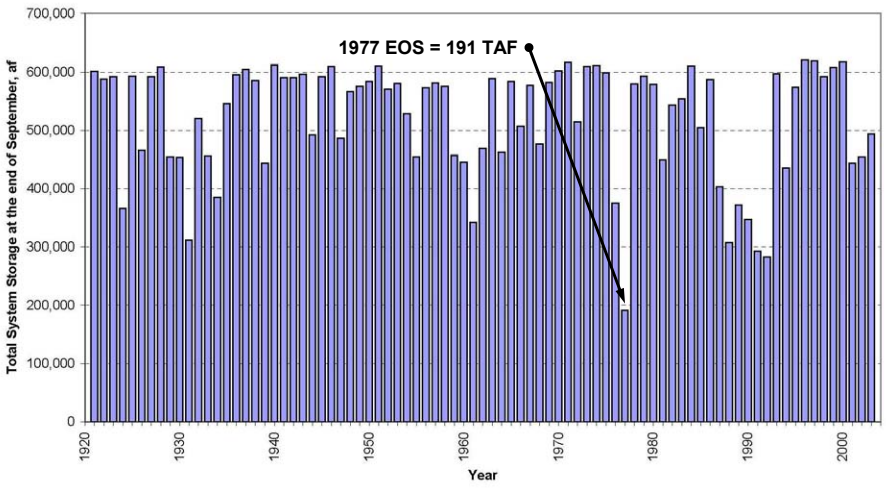
Water Supply Management Program 2040

Simulated Carryover Storage

Demand = 258 MGD, with Freeport Supply



EBMUD Water Supply Management Program 2040

Recommendation

Continue with existing drought planning sequence: 1976/1977 with simulated 1978

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EBMUD Water Supply Management Program 2040

Evaluation Criteria

Approach

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional
- Provide water supply reliability.
- Preserve current water right entitlements.
- Promote District involvement in regional, sustainable solutions.

Economic
- Minimize cost to District customers.
- Minimize drought impact to District customers.

Public Health, Safety & Community
- Ensure the high quality of the District's water supply.
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- Minimize risks to public health & safety.
- Maximize security of infrastructure & water supply.

Environmental
- Preserve & protect the environment for future generations.
- Preserve & protect biological resources.
- Contribute to reduction in carbon footprint.
- Promote recreational opportunities.

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

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Environmental
- Preserve & protect the environment for future generations.
- Preserve & protect biological resources.
- Contribute to reduction in carbon footprint.
- Promote recreational opportunities.

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Water Supply Management Program 2040

Exclusionary Criteria

1. The program components and Preferred Portfolio must be technically feasible. It must be possible to develop and operate the program components and Preferred Portfolio based on accepted, state-of-the-art engineering considerations.

2. Existing facilities and program components must not be located in an area of, or constitute, unmitigable geologic, hydrologic or toxic/hazardous materials hazards.

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Water Supply Management Program 2040

Exclusionary Criteria

3. The program components and Preferred Portfolio must be logistically (i.e., legally and institutionally) feasible (i.e., must be available or capable of being made available). The overall portfolios must meet all existing and anticipated water rights permit and license conditions and all dam and reservoir operating permit conditions, including releases for instream uses and downstream users.

4. The Preferred Portfolio must ensure that water supply portfolios provide reliability during the District's Drought Planning Sequence.

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Water Supply Management Program 2040

Evaluation Criteria

1. The program components and Preferred Portfolio should minimize the risk of disruptions in service by maximizing the institutional and technical reliability of service.
2. The program components and Preferred Portfolio should maximize the system's operational flexibility to respond to change (including changes in water demands).
3. The program components and Preferred Portfolio should maximize implementation flexibility to respond to change (including incremental implementation or phasing of components as demands and needs change).

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Water Supply Management Program 2040

Evaluation Criteria

4. The program components and Preferred Portfolio should minimize logistical (i.e. legal and institutional) problems.
5. The Preferred Portfolio should minimize rationing due to drought.
6. Implementation of program components and Preferred Portfolio should be facilitated by involvement in regional solutions (e.g., desalination, interties).

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EBMUD Water Supply Management Program 2040

CLC Meeting #1

Review

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EBMUD Water Supply Management Program 2040

- Productive introductory meeting: 12 of 19 attended
- Agreed on 2007 meeting frequency and dates: July 10, September 11, December 3
- Challenge: balance questions and input from those that are very knowledgeable with those that are less so

40

Water Supply Management Program 2040

Primary Issues Raised

1. Future scenarios with or without 2040 plan
2. Digital alternatives evaluation
3. Intersection of water supply and water treatment: consider potential for more water supply options with greater treatment capability
4. Regional solutions - tie to land use

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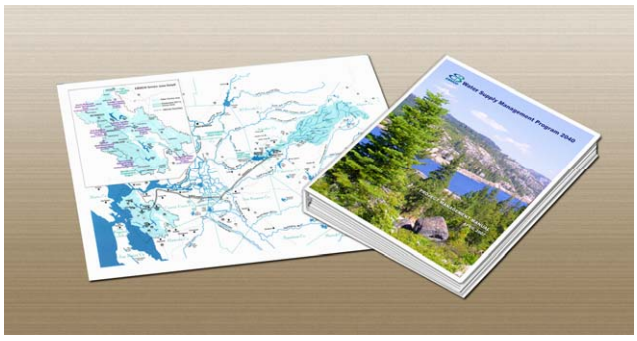
Water Supply Management Program 2040

CLC Objectives

- Ensure that CLC suggestions are considered
- Use CLC as a sounding board
- Strive for CLC support for preferred portfolio



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Water Supply Management Program 2040

CLC Meeting #2: July 10, 2007

Agenda

1. Demands Study
   - Status Report
   - Preliminary Demand Estimate
2. Drought Planning Sequence
3. Evaluation Criteria Approach

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Water Supply Management Program 2040

Board of Directors Workshop #2

June 26, 2007

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Water Supply Management Program 2040

Water Transfers

Overview

1

Water Supply Management Program 2040

Today

1. Why are water transfers a consideration for EBMUD?
2. Water Transfer Basics
   - Definition
   - Legal & Regulatory Framework
   - Agency Roles
3. Examples – how is it done?
4. Potential Opportunities for EBMUD
5. Next Steps

2

Water Supply Management Program 2040

Why consider water transfers?

1. Innovative approach for optimizing water resources & infrastructure
2. Urban & Environmental water demand projected to increase statewide
3. Freeport facility provides unique opportunity – existing infrastructure for conveyance

3

Water Supply Management Program 2040

What is a Water Transfer?

- A change in the way water is allocated:
  - Expand use to new areas
  - Allows alternative use of water without extensive additional facilities
- From a water rights perspective:
  - Change in Place or Purpose of Use
  - Change in Point of Diversion
  - Cannot increase the amount or season

Source: Jerry Johns, DWR

4

Water Supply Management Program 2040

Primary Mechanisms

- Direct Diversion
  - From surface water, then conveyed into delivery & treatment system
- Storage
  - Groundwater banking, stored for later use
- In-Lieu Use/Exchange
  - Groundwater used instead of surface water
  - "Paper" transfer

5

Water Supply Management Program 2040

Types of Water Transfers

1. Temporary
   - One year or less
   - Most common
   - Minimal CEQA & regulatory review
   - Lowest long-term reliability
2. Long-term
   - Greater than one year
   - Complex, highly detailed, may require extensive environmental review
   - More reliable
3. Outright Sale / Assignment of Water Right
   - Permanent, give up water right
   - Most reliable

6

Water Supply Management Program 2040

Three Primary Rules

1. No injury to any legal user of water
2. No unreasonable effects to fish or wildlife
3. No unreasonable economic effects to overall economy of the county from which the water is transferred

Source: Jerry Johns, DWR

7

Water Supply Management Program 2040

Legal & Regulatory Framework

1. Directed by legislative policy
2. Governed by water code
3. State Water Plan (2005): Ensure sustainable water use by the "facilitation of environmentally, economically, and socially sound transfers to avoid regional shortages"

8

Water Supply Management Program 2040

Legal & Regulatory Framework

- Pre-1914
  - Not under State Board jurisdiction
- Post-1914
  - Under State Board jurisdiction

9

Water Supply Management Program 2040

Agency Roles - State Water Board

- Jurisdiction over transfers that are a change in place or purpose of use, or point of diversion
- Approximately 5 short-term/year reviewed by State Board (out of 25 – 50 total/year)
- Approximately 5 long-term in last 8 years
- Cost of water (payment to seller): $25/AF (wet year) to $150/AF (dry year)

10

Water Supply Management Program 2040

Agency Roles - USBR

- Facilitates transfers of CVP water
- 95% of transfers are short-term & between CVP contractors
- Since 2000: between 300 TAF & 560 TAF annually
- CVP to Non-CVP: since 2000 between15 AF & 36 TAF annually

11

Water Supply Management Program 2040

Reliability – Will water be there?

- Most reliable: purchase or long-term lease of pre-1914 Water Rights
- Promising: groundwater banking
- Availability of SWP or CVP water
  - Lower reliability but Freeport provides greater ease of conveyance
- State Water Bank

12

Water Supply Management Program 2040

Why consider water transfers?

1. Innovative approach for optimizing water resources & infrastructure
2. Urban & Environmental water demand projected to increase statewide
3. Freeport facility provides unique opportunity – existing infrastructure for conveyance

13

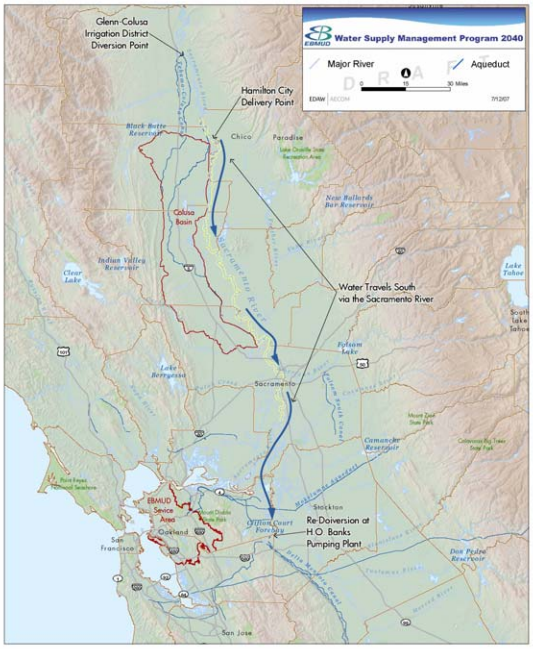
Water Supply Management Program 2040

Examples of Water Transfers

How is it done?

14

Glenn-Colusa Irrigation District Water Transfer to Metropolitan Water District (and others)



15

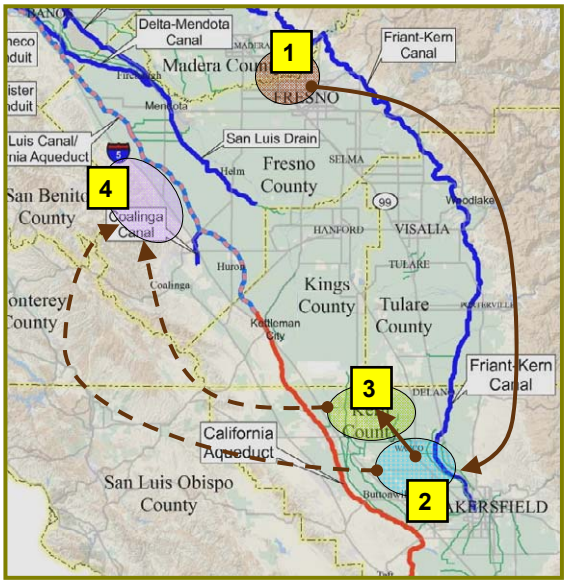
Madera Irrigation District

LEGEND

Water Transfer Mode

- = via CVP exchange
- = via direct delivery

1	= MID
2	= NKWSD
3	= Semitropic
4	= WWD



Water Supply Management Program 2040

Potential Roles for EBMUD

1. Buyer
2. Utilize EBMUD facilities for conveyance
3. Receive money or water for use of conveyance

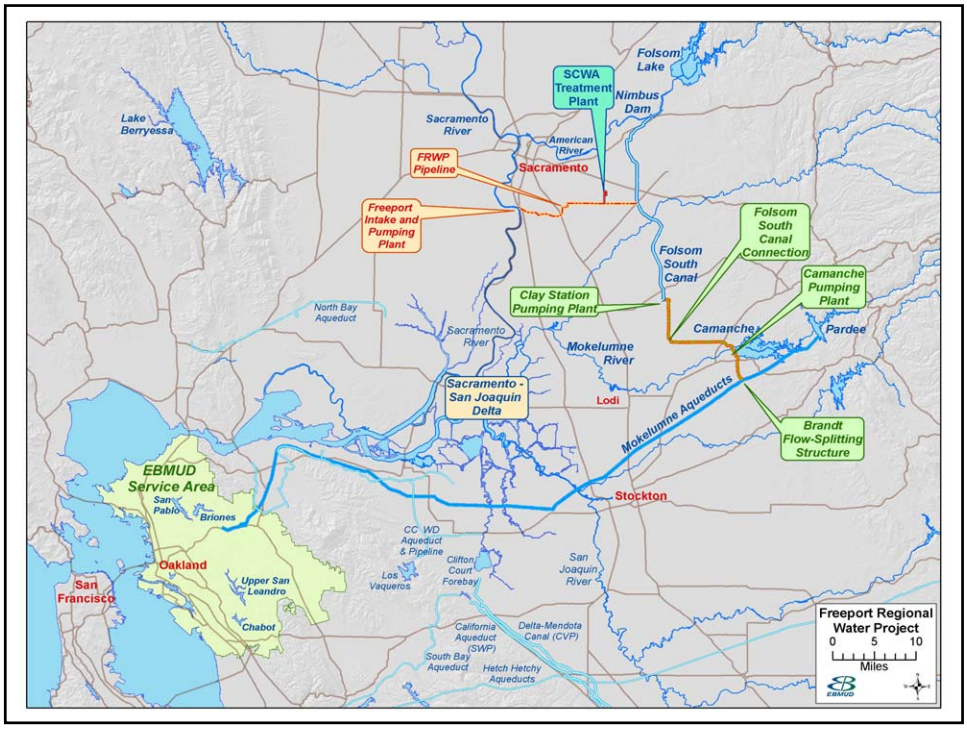
17

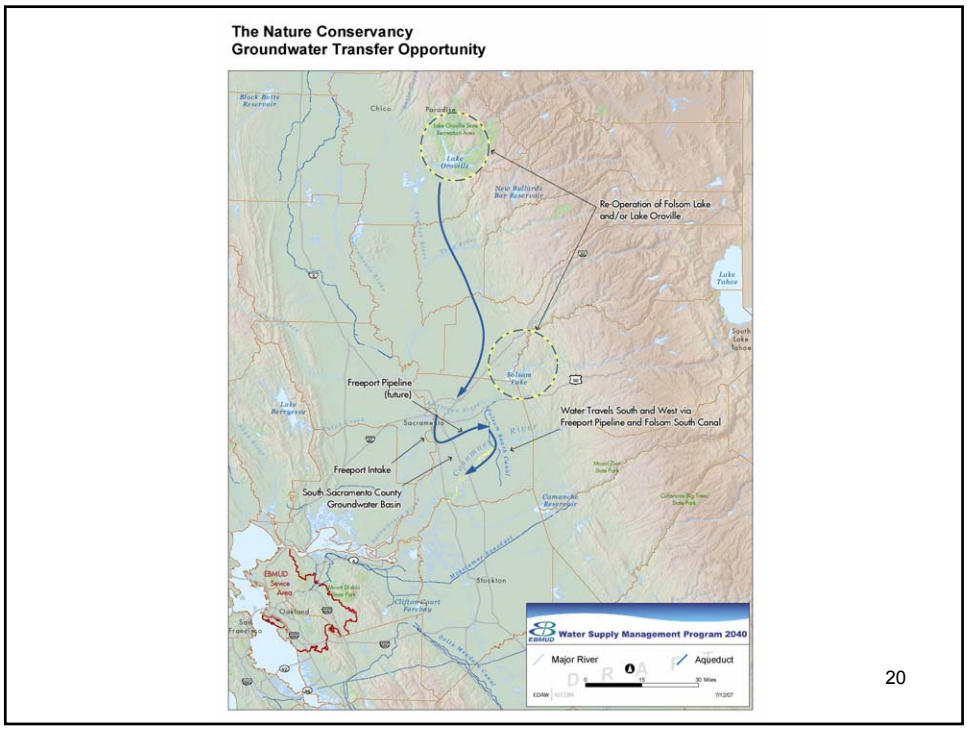
Water Supply Management Program 2040

Potential Water Transfer Partners

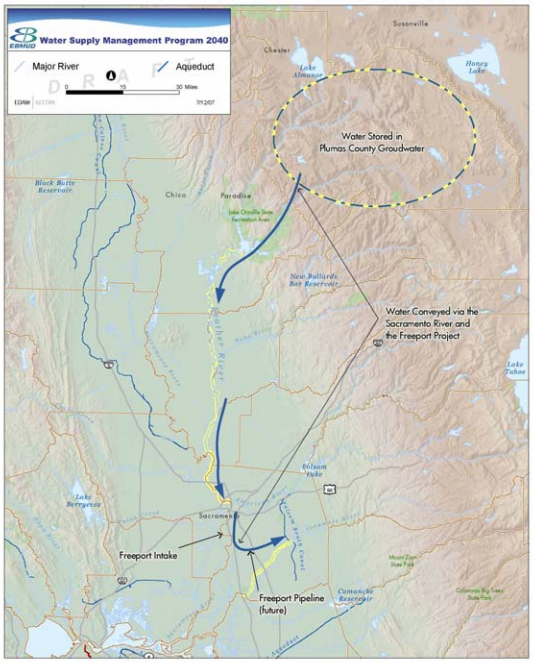
1. Contra Costa Water District
2. Santa Clara Valley Water District
3. San Francisco Public Utilities Commission
4. Alameda County Water Agency
5. Zone 7 Water Agency
6. City of Lodi
7. Amador Water Agency
8. Woodbridge Irrigation District
9. Glen-Colusa Irrigation District
10. Plumas County
11. City of Folsom
12. Calaveras County Water District
13. Butte County
14. Yuba County
15. Byron-Bethany Irrigation District
16. Individual Agricultural Users

18

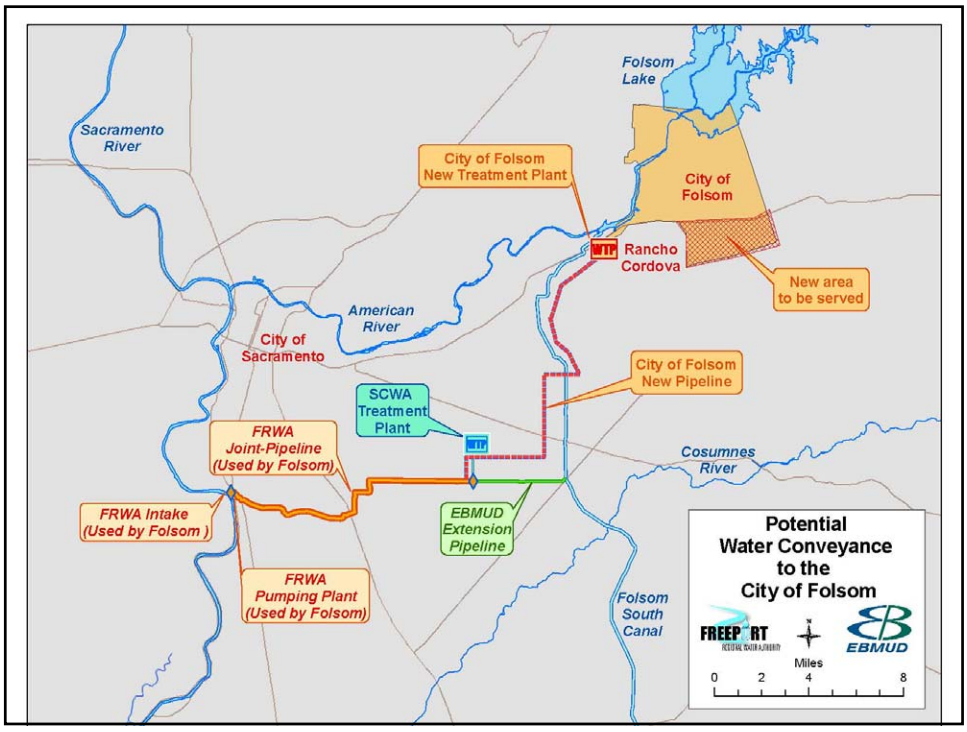

Folsom Lake
SCWA Treatment Plant
Nimbus Dam
Lake Berryessa
Sacramento River
American River
FRWP Pipeline
Sacramento
Freeport Intake and Pumping Plant
Folsom South Canal Connection
Folsom South Canal
Camanche Pumping Plant
Clay Station Pumping Plant
North Bay Aqueduct
Sacramento River
Camanche
Pardee
Mokelumne River
Sacramento - San Joaquin Delta
Lodi
Mokelumne Aqueducts
Brandt Flow-Splitting Structure
EBMUD Service Area
San Pablo
Briones
Stockton
CC WD Aqueduct & Pipeline
Clifton Court Forebay
San Joaquin River
Oakland
San Francisco
Upper San Leandro
Los Vaqueros
Chabot
California Aqueduct (SWP)
Delta-Mendota Canal (CVP)
South Bay Aqueduct
Hetch Hetchy Aqueducts
Freeport Regional Water Project
0 5 10
Miles


The Nature Conservancy
Groundwater Transfer Opportunity
Re-Operation of Folsom Lake and/or Lake Oroville
Freeport Pipeline (future)
Water Travels South and West via Freeport Pipeline and Folsom South Canal
Freeport Intake
South Sacramento County Groundwater Basin
Water Supply Management Program 2040
Major River
Aqueduct
20

Plumas County Transfer Opportunity



21



Water Supply Management Program 2040

Next Steps

1. Refine list of potential transfer options
2. Review process for implementation & challenges
3. Determine appropriate role in water supply portfolios

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Water Supply Management Program 2040

Range of Components

24

Water Supply Management Program 2040

Components

1. Supplemental Supply
2. Conservation Goals & Programs
3. Recycled Water Projects

Water Supply Management Program 2040

Criteria for Initial List of Components

1. Passed WSMP 2020 early screening
2. Passed Freeport early screening
3. Actively under consideration by District
4. Projects now viable due to Freeport

EBMUD Water Supply Management Program 2040

Supplemental Supply

Statewide (CALFED)
1. Raise Shasta Reservoir
2. Temperance Flat
3. SITES Reservoir
4. Expanded Los Vaqueros

Upcountry
1. Pardee
2. Camanche
3. Lower Bear
4. Middle Bar
5. Inter-Regional Conjunctive Use Project
6. Water Transfers

Central Valley
1. Groundwater Banking/Exchange (San Joaquin Basin)
2. Groundwater Banking/Exchange (Sacramento Basin)
3. Duck Creek Reservoir
4. Water Transfers

Local (East Bay)
1. Kellogg Reservoir
2. Buckhorn Canyon Reservoir
3. Cull Canyon Reservoir
4. Curry Canyon Reservoir
5. Bollinger Canyon Reservoir
6. Bayside GW – Phase 2
7. Regional Desalination
8. Low Energy Application for Desalination (LEAD) at C&H Sugar
9. Off-Shore Desalination
10. Water Transfers with Bay Area Agencies

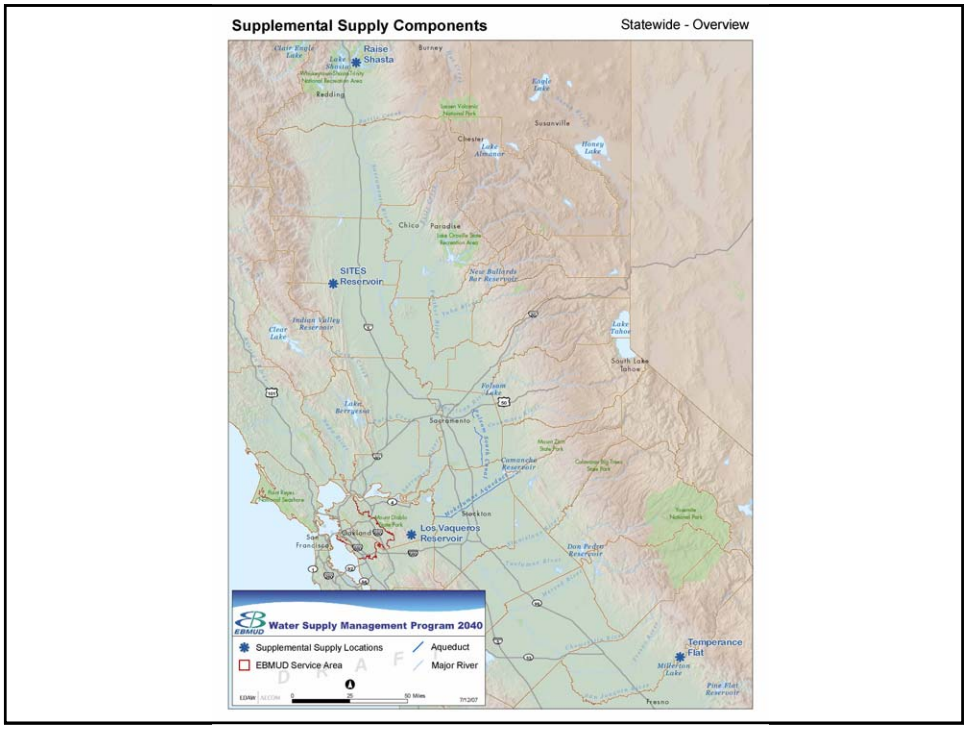
EBMUD Water Supply Management Program 2040

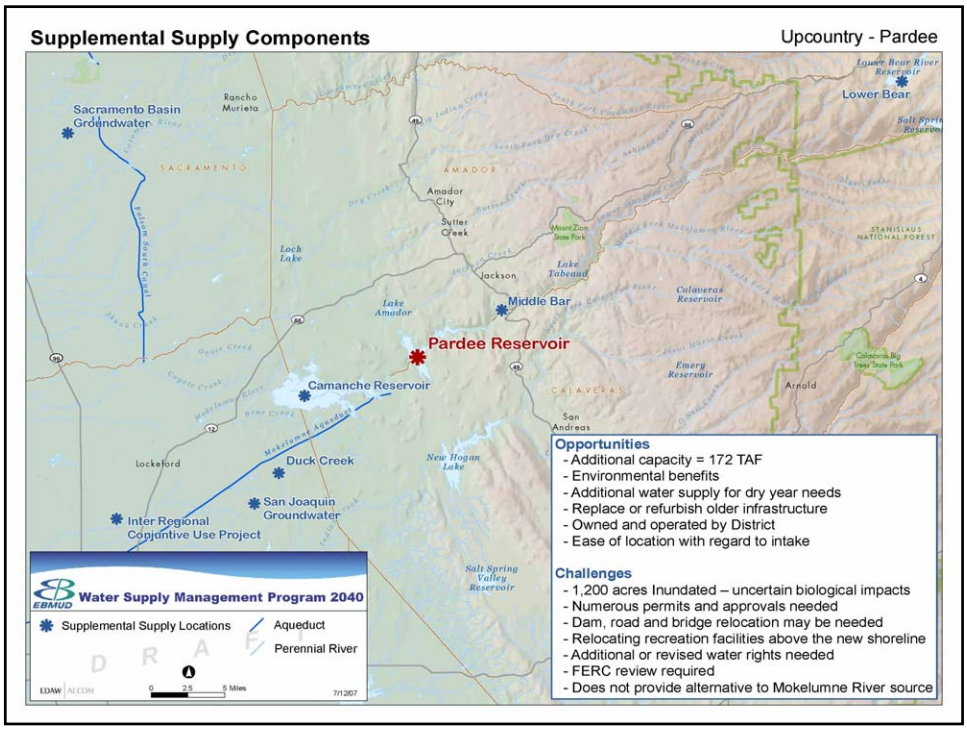
Evaluated & Excluded in Freeport Analysis

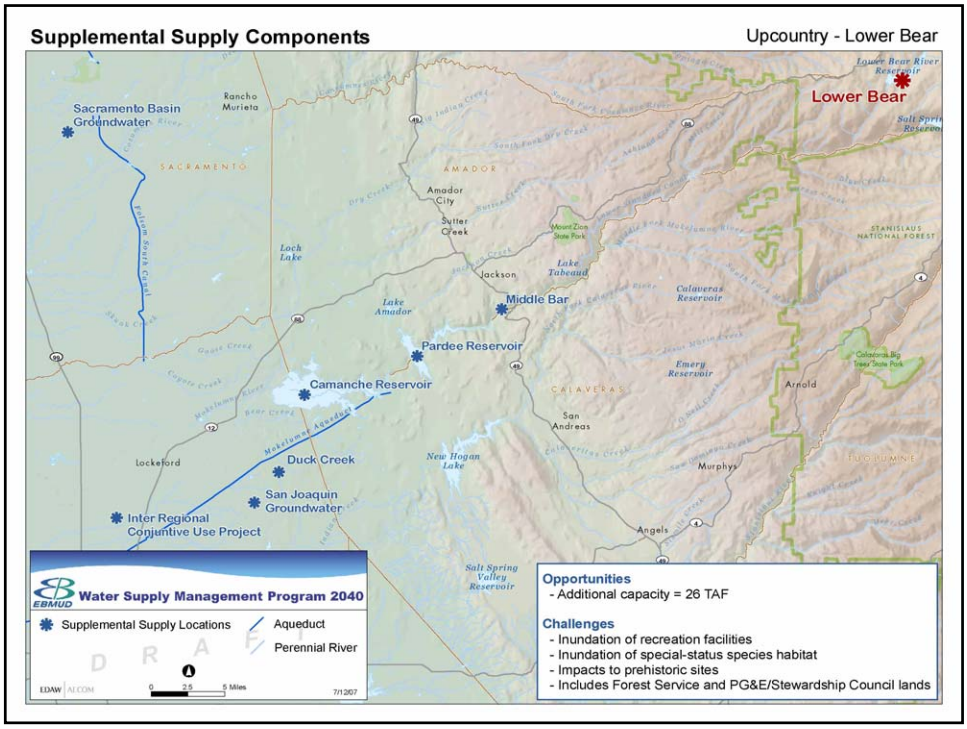
- Cursory review conducted to verify exclusion

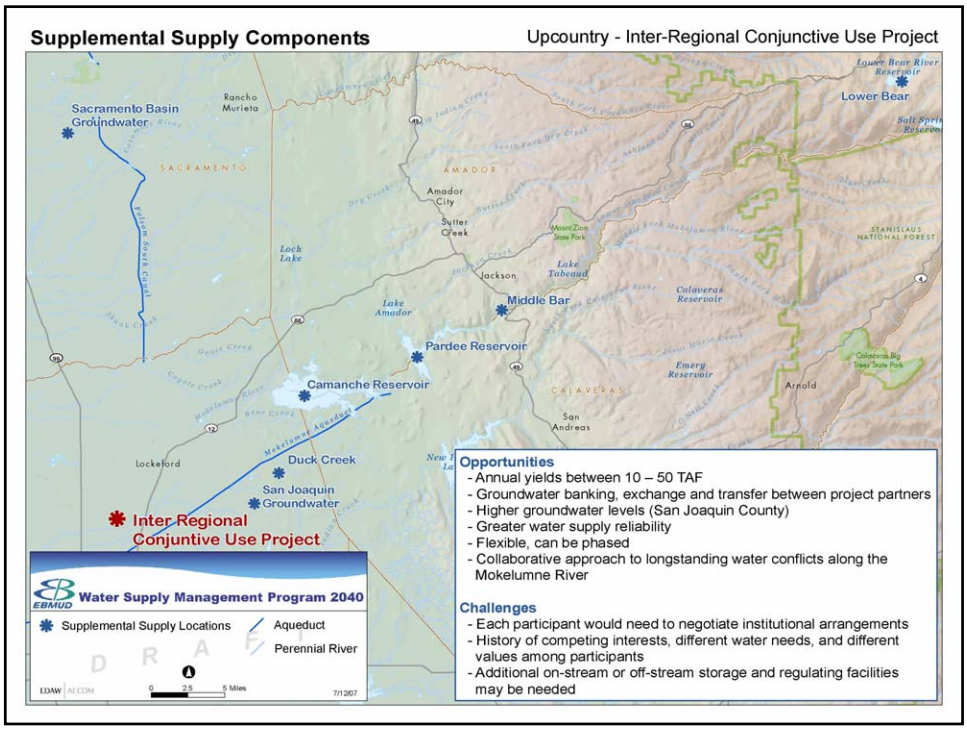
1. Alamo Creek Reservoir
2. Bailey Road Reservoir
3. Bolinas Reservoir
4. Enlarge Briones Reservoir
5. Upper Buckhorn Reservoir
6. Canada del Cierbo Reservoir
7. Enlarge Chabot Reservoir
8. Clay Station Reservoir
9. Kaiser Reservoir
10. Upper Kaiser Reservoir
11. Kirker Reservoir
12. Enlarge Lafayette Reservoir
13. Mitchell Canyon Reservoir
14. Montezuma Hills reservoir
15. Morningside Reservoir
16. Nichols Reservoir
17. Pinole Reservoir
18. Railroad Flat Reservoir
19. Rodeo Reservoir
20. San Leandro Reservoir
21. Sidney Flat Reservoir
22. Tassajera Reservoir
23. Tice Valley Reservoir
24. Enlarge Upper San Leandro Reservoir
25. Enlarge San Pablo reservoir
26. Bixler Groundwater Storage
27. Mokelumne River Salt Springs
28. Watershed Cloud Seeding
29. Mokelumne River Devil's Nose Supply
30. Tanker Transport of Canadian Water Supplies
31. North Fork Stanislaus River Supply
32. South Bay Aqueduct Intertie
33. Tuolumne Hetch Hetchy Intertie
34. Yuba River Water by Barge
35. Cosumnes River Source
36. Iceberg Source
37. Auburn Dam

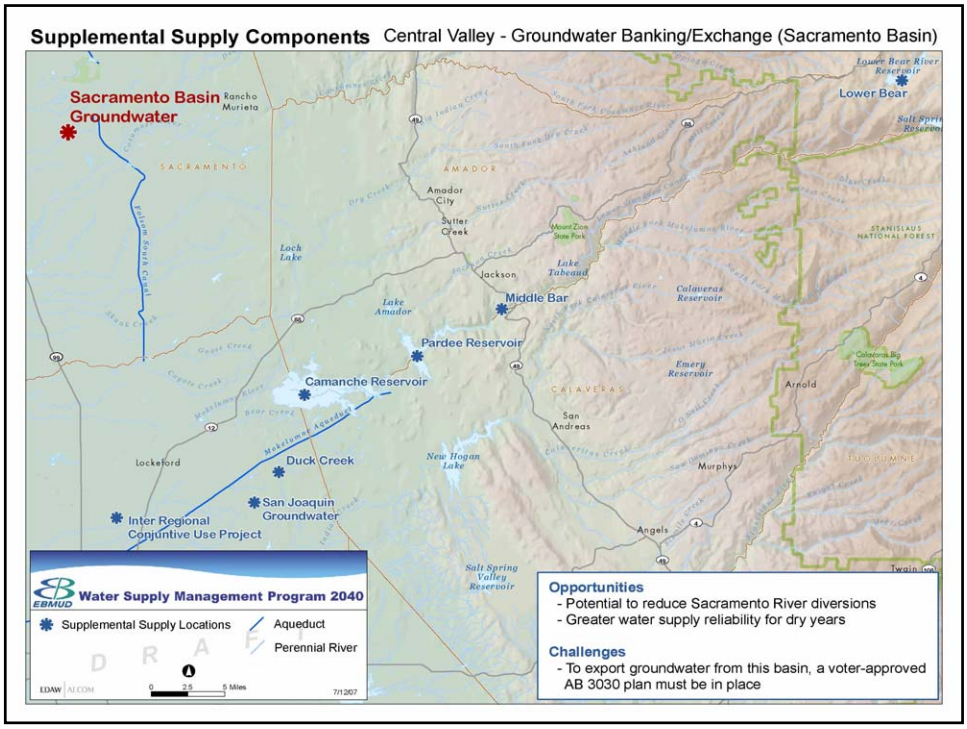
28

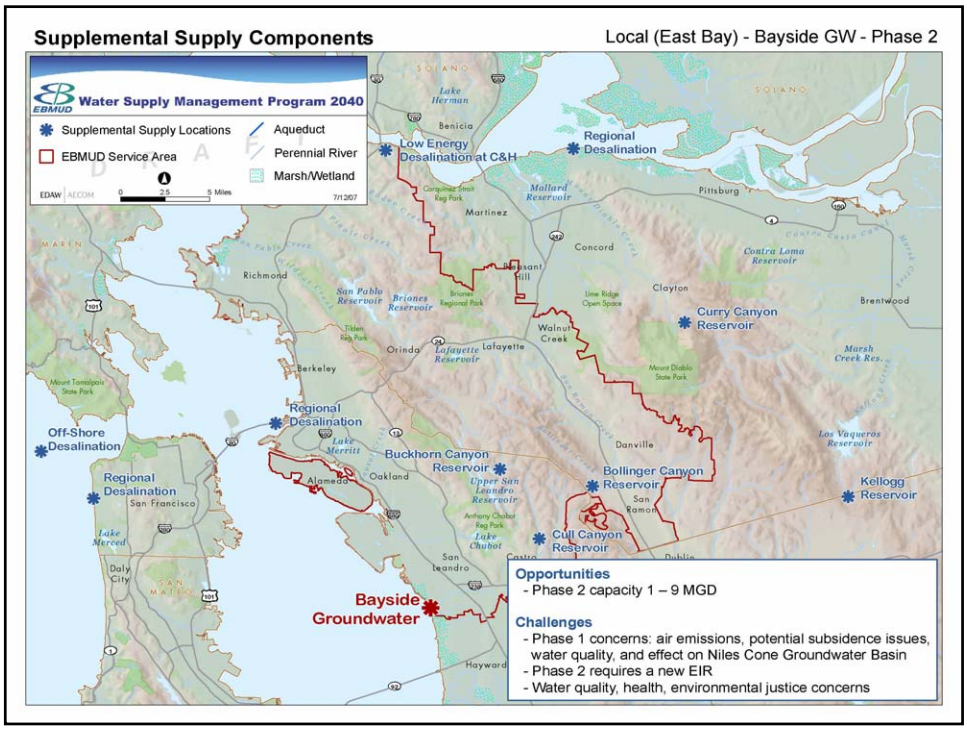

Supplemental Supply Components
Statewide - Overview
Raise Shasta
SITES Reservoir
Los Vaqueros Reservoir
Temperance Flat
Water Supply Management Program 2040
Supplemental Supply Locations
EBMUD Service Area
Aqueduct
Major River
DRAFT


Supplemental Supply Components
Upcountry - Pardee
Sacramento Basin Groundwater
Lower Bear
Middle Bar
Pardee Reservoir
Camanche Reservoir
Duck Creek
San Joaquin Groundwater
Inter Regional Conjuntive Use Project
Opportunities
- Additional capacity = 172 TAF
- Environmental benefits
- Additional water supply for dry year needs
- Replace or refurbish older infrastructure
- Owned and operated by District
- Ease of location with regard to intake
Challenges
- 1,200 acres Inundated – uncertain biological impacts
- Numerous permits and approvals needed
- Dam, road and bridge relocation may be needed
- Relocating recreation facilities above the new shoreline
- Additional or revised water rights needed
- FERC review required
- Does not provide alternative to Mokelumne River source
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
DRAFT

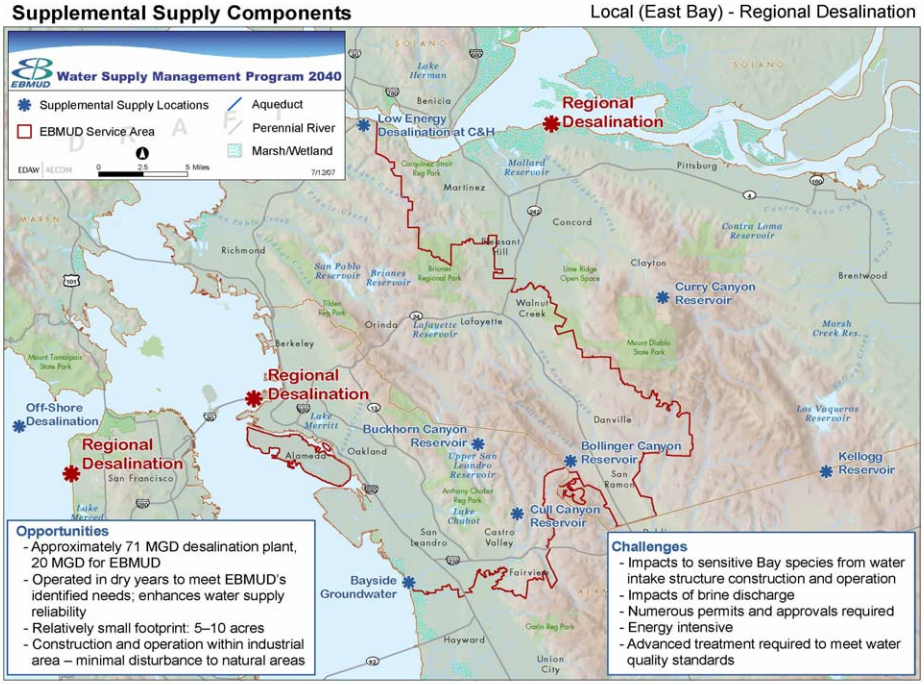

Supplemental Supply Components
Upcountry - Lower Bear
Lower Bear
Sacramento Basin Groundwater
Middle Bar
Pardee Reservoir
Camanche Reservoir
Duck Creek
San Joaquin Groundwater
Inter Regional Conjuntive Use Project
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
DRAFT
Opportunities
- Additional capacity = 26 TAF
Challenges
- Inundation of recreation facilities
- Inundation of special-status species habitat
- Impacts to prehistoric sites
- Includes Forest Service and PG&E/Stewardship Council lands


Supplemental Supply Components
Upcountry - Inter-Regional Conjunctive Use Project
Lower Bear
Sacramento Basin Groundwater
Middle Bar
Pardee Reservoir
Camanche Reservoir
Duck Creek
San Joaquin Groundwater
Inter Regional Conjuntive Use Project
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
DRAFT
Opportunities
- Annual yields between 10 – 50 TAF
- Groundwater banking, exchange and transfer between project partners
- Higher groundwater levels (San Joaquin County)
- Greater water supply reliability
- Flexible, can be phased
- Collaborative approach to longstanding water conflicts along the Mokelumne River
Challenges
- Each participant would need to negotiate institutional arrangements
- History of competing interests, different water needs, and different values among participants
- Additional on-stream or off-stream storage and regulating facilities may be needed


Supplemental Supply Components
Central Valley - Groundwater Banking/Exchange (Sacramento Basin)
Sacramento Basin Groundwater
Lower Bear
Middle Bar
Pardee Reservoir
Camanche Reservoir
Duck Creek
San Joaquin Groundwater
Inter Regional Conjuntive Use Project
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
DRAFT
Opportunities
- Potential to reduce Sacramento River diversions
- Greater water supply reliability for dry years
Challenges
- To export groundwater from this basin, a voter-approved AB 3030 plan must be in place


Supplemental Supply Components
Local (East Bay) - Bayside GW - Phase 2
Water Supply Management Program 2040
Supplemental Supply Locations
EBMUD Service Area
Aqueduct
Perennial River
Marsh/Wetland
DRAFT
Low Energy Desalination at C&H
Regional Desalination
Curry Canyon Reservoir
Off-Shore Desalination
Regional Desalination
Buckhorn Canyon Reservoir
Bollinger Canyon Reservoir
Cull Canyon Reservoir
Kellogg Reservoir
Bayside Groundwater
Opportunities
- Phase 2 capacity 1 – 9 MGD
Challenges
- Phase 1 concerns: air emissions, potential subsidence issues, water quality, and effect on Niles Cone Groundwater Basin
- Phase 2 requires a new EIR
- Water quality, health, environmental justice concerns

Supplemental Supply Components Local (East Bay) - Regional Desalination



Water Supply Management Program 2040

Next Steps

1. Further Develop Supplemental Supply Components (July – October 2007)
2. Evaluate & Screen **ALL** Components (October – November 2007)
3. Present Developed Supplemental Supply Components at BOD #5 (11/27/07)
4. Assemble into preliminary portfolios (January – February 2008)
5. Present Screened Components at BOD #6 (2/26/08)
6. Present Screened Portfolios at BOD #7 (4/22/08)

Water Supply Management Program 2040

Conservation
1995 – 2008

1. Considered completed for WSMP 2040 planning
2. Water savings estimates:
   - 19.5 MGD through 2006
   - 1.5 MGD/yr for 2007 & 2008
   - 22.5 MGD total (District + natural savings)
3. Programs:
   - Residential and non-residential water surveys and incentives (plumbing fixtures, appliances, irrigation, etc)
   - Natural Conservation (codes & regulatory)
   - Education & Outreach

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Water Supply Management Program 2040

Conservation Approach
2008 & beyond

- Consider range of measures from natural savings to total "need for water"
- Maximize "technology" over "behavioral" savings
- Evaluate "demand hardening" implications
- Evaluate supply side (non-revenue) savings

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Water Supply Management Program 2040

Conservation Ranges

2008 & beyond (Preliminary)*

Level of Conservation	Total District-driven 2009-2040	Total Conserved by 2020 **	Total Conserved by 2040**
Natural Savings Only	0MGD	29 MGD	36 MGD
Low District Investment (avg. 0.25 MGD per year)	7-9 MGD	31-33 MGD	43-45 MGD
Medium District Investment (avg. 0.5 MGD per year)	14-18 MGD	33-37 MGD	50-54 MGD
High District Investment (avg. 0. 65 MGD/year)	18-24 MGD	34-40 MGD	54-60 MGD
Maximum Conservation - implementing all measures under consideration	22-30 MGD	35-43 MGD	59-65 MGD

* Not yet evaluated for cost, feasibility, customer acceptance, and savings decay.
** Assumes 22.5 MGD conservation by 2008, natural savings of 6.5 MGD 2009-2020 and 7.0 MGD 2020-2040

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Water Supply Management Program 2040

Next Steps

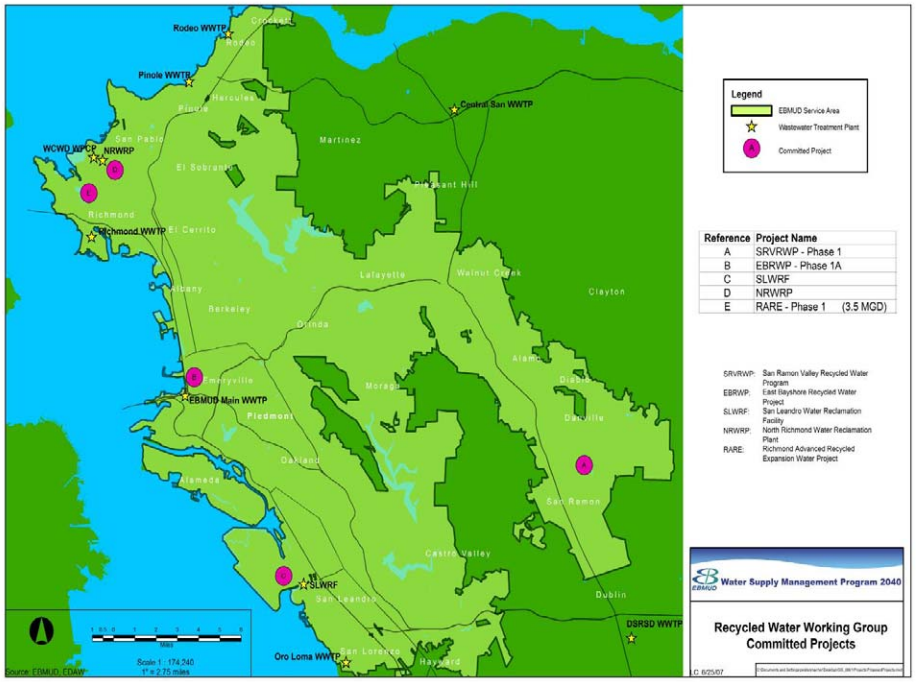
1. Further Develop Conservation Components (July - August 2007)
2. Prepare Technical Memo (August 2007)
3. Present Developed Conservation Components at BOD Workshop #4 (9/25/07)

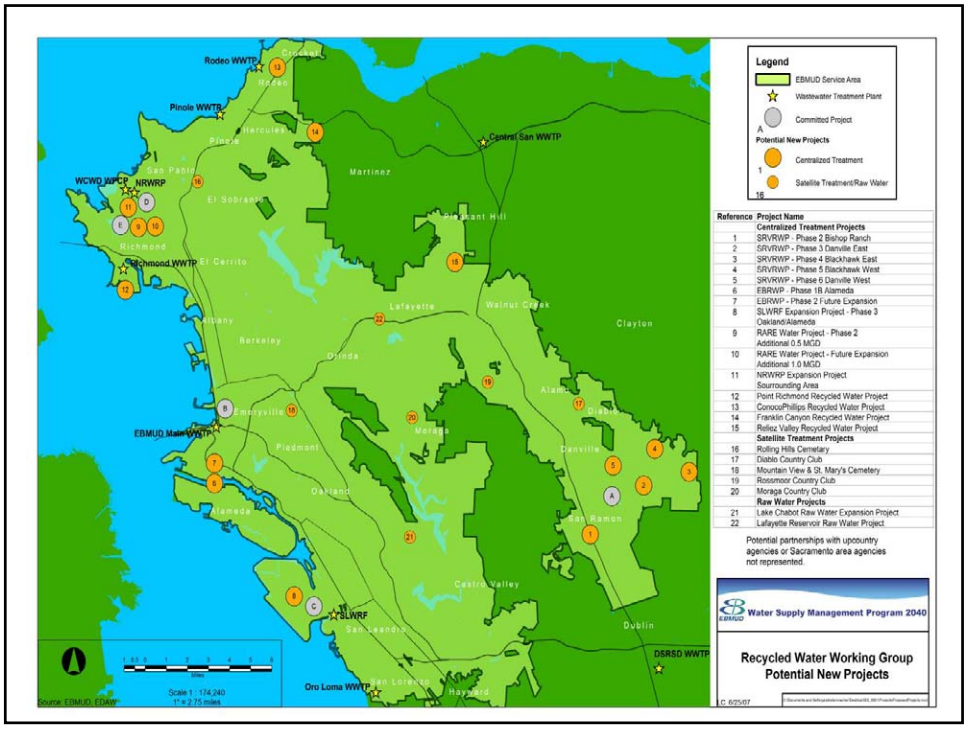
Water Supply Management Program 2040

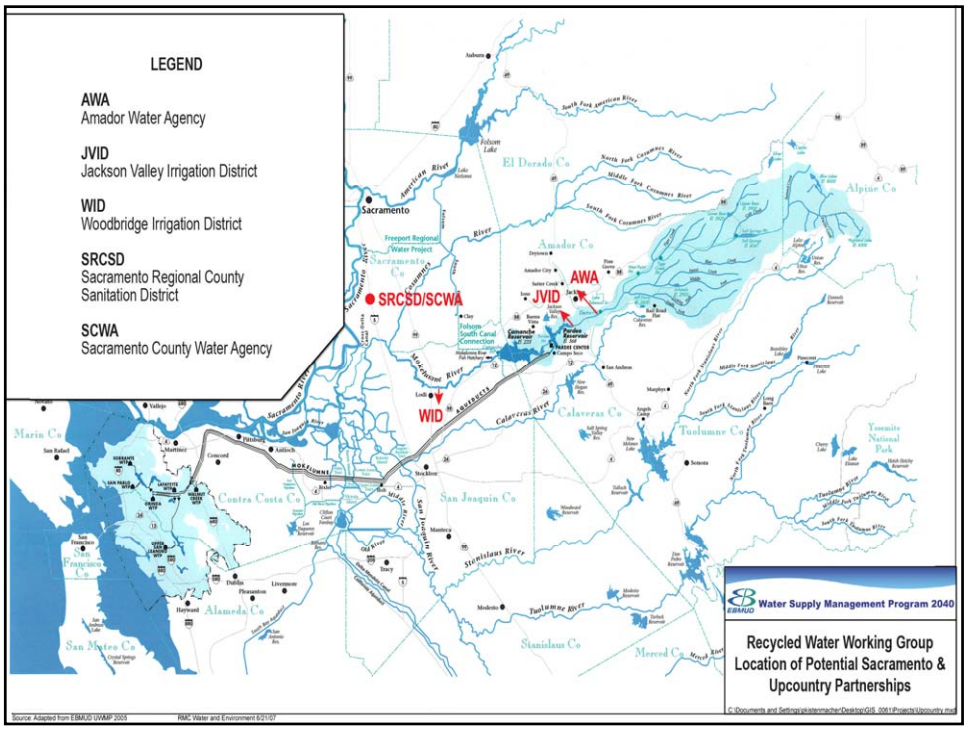
Recycled Water/Non-Potable Water

4 Categories:

1. Committed Projects
2. Potential New Projects within EBMUD Service Area
   - Centralized Treatment
   - Satellite Treatment
   - Raw Water
   - Groundwater (non-potable use)
   - Salt Water (fire suppression)
3. Potential Partnerships with Upcountry Agencies
4. Potential Partnership with Sacramento Area Agencies




Legend
EBMUD Service Area
Wastewater Treatment Plant
Committed Project
Potential New Projects
Centralized Treatment
Satellite Treatment/Raw Water
Reference Project Name
Centralized Treatment Projects
1 SRVRWP - Phase 2 Bishop Ranch
2 SRVRWP - Phase 3 Danville East
3 SRVRWP - Phase 4 Blackhawk East
4 SRVRWP - Phase 5 Blackhawk West
5 SRVRWP - Phase 6 Danville West
6 EBRWP - Phase 1B Alameda
7 EBRWP - Phase 2 Future Expansion
8 SLWRF Expansion Project - Phase 3 Oakland/Alameda
9 RARE Water Project - Phase 2 Additional 0.5 MGD
10 RARE Water Project - Future Expansion Additional 1.0 MGD
11 NRWRP Expansion Project Sourrounding Area
12 Point Richmond Recycled Water Project
13 ConocoPhillips Recycled Water Project
14 Franklin Canyon Recycled Water Project
15 Rellez Valley Recycled Water Project
Satellite Treatment Projects
16 Rolling Hills Cemetary
17 Diablo Country Club
18 Mountain View & St. Mary's Cemetery
19 Rossmoor Country Club
20 Moraga Country Club
Raw Water Projects
21 Lake Chabot Raw Water Expansion Project
22 Lafayette Reservoir Raw Water Project
Potential partnerships with upcountry agencies or Sacramento area agencies not represented.
Water Supply Management Program 2040
Recycled Water Working Group
Potential New Projects
Rodeo WWTP
Pinole WWTP
Central San WWTP
WCWD WPCP
NRWRP
Richmond WWTP
EBMUD Main WWTP
SLWRF
Oro Loma WWTP
DSRSD WWTP
Crockett
Hercules
Martinez
Pleasant Hill
El Sobrante
San Pablo
Richmond
El Cerrito
Albany
Berkeley
Lafayette
Walnut Creek
Clayton
Orinda
Moraga
Alamo
Danville
San Ramon
Emeryville
Piedmont
Oakland
Alameda
Castro Valley
San Leandro
Hayward
Dublin


LEGEND
AWA
Amador Water Agency
JVID
Jackson Valley Irrigation District
WID
Woodbridge Irrigation District
SRCSD
Sacramento Regional County Sanitation District
SCWA
Sacramento County Water Agency
SRCSD/SCWA
AWA
JVID
WID
Sacramento
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
Yosemite National Park
San Joaquin Co
Stanislaus Co
Merced Co
Contra Costa Co
Alameda Co
Marin Co
San Mateo Co
San Francisco Co
Water Supply Management Program 2040
Recycled Water Working Group
Location of Potential Sacramento & Upcountry Partnerships

Water Supply Management Program 2040

Next Steps

1. Further Develop Recycled Water Components (July – August 2007)
2. Prepare Technical Report (July – August 2007)
3. Present Developed Recycled Water Components to the Board (September 2007)

Water Supply Management Program 2040

Evaluation of Climate Change Impacts

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Water Supply Management Program 2040

Today

1. Background
   - CA Regulations
   - Global Climate Change Science
2. Potential Impacts – CA & EBMUD
3. Approach for WSMP 2040

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Water Supply Management Program 2040

CA Formally Addresses Global Climate Change

- 2005: Executive Order signed committing CA to Emissions Reduction Goals
- 2006: DWR progress report on meeting targets & global warming impacts to CA
- 2006: California Global Warming Solutions Act

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Water Supply Management Program 2040

Global Climate Change Science

- 20+ global climate change models (GCMs) used in 18 modeling centers worldwide
- 4 main climate change scenarios
- Factors analyzed include air temperature, precipitation, humidity, latent heat flux, radiation flux & wind speeds

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Water Supply Management Program 2040

General Conclusions of CA Regional Modeling

- Temperature Increases
  - Observed & expected to continue
  - 1.4 to 5.8 C increase by 2100
- Sea Level Rise
- Precipitation Changes
  - 25% below normal to 77% above normal by 2100
- Snow Pack
  - Increase in Sierra snow pack at higher elevations
  - Snow pack melts earlier
- Evaporation
  - At higher elevations, potentially more clouds and precipitation could lead to cooling
- Plant water requirements
  - Global warming may or may not increase these requirements
- Vegetation is a carbon sink
  - Increased vegetation could decrease carbon dioxide levels.
- Increased ocean temperatures
  - Would release more CO_2 into the atmosphere than would be removed by increased vegetation
  - Melting ice could offset ocean warming and impact salinity levels

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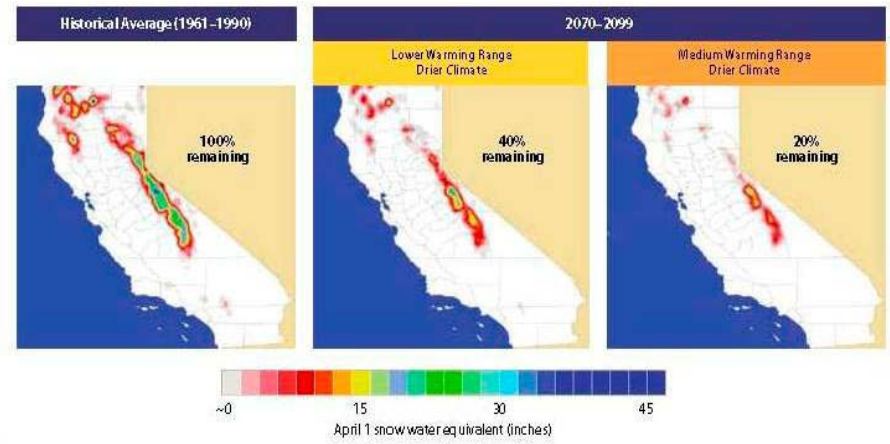
Water Supply Management Program 2040

Decreasing California Snowpack



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Source: Our Changing Climate, Summary Report from the CA Climate Change Center, 2006

Water Supply Management Program 2040

Water Resources Impact & Risk Analysis

- Multiple means for impact evaluation
- Analyses by CA Climate Change Center & DWR (and underway by others) included:
  - SWP/CVP operations
  - Delta water quality
  - Sea level rise
  - Flood management
  - Water supply forecasting
  - Evapotranspiration
- Climate change occurring now; even greater changes anticipated from 2050 on

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Water Supply Management Program 2040

Potential Impacts on EBMUD

- Increased water demands for outdoor uses
- Change in timing of Mokelumne River spring runoff
- Increased challenges in reservoir management
- Change in volume of Mokelumne River runoff
- Increased flooding resulting in infrastructure impacts
- Change in snowpack
- Change in drought frequency & duration

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Water Supply Management Program 2040

Goal

- *Focus on how EBMUD system is vulnerable to climate change*
- *Conduct sensitivity analysis to evaluate & score flexibility of each portfolio to respond to climate change*
- *Consider secondary (or backup) elements for use under worsening conditions or predictions*

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Water Supply Management Program 2040

Challenges

- Evolving science – even as we speak
- Compounded uncertainties
  - In GCMs
  - In downscaling from global to regional effects
  - In application to hydrology
- Most work conducted to evaluate conditions at 2050 to 2100
- Unknown future emission conditions
- Unknown future demands

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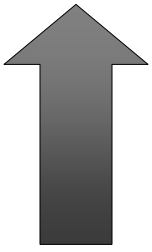
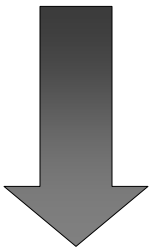
Water Supply Management Program 2040

General Approaches - Water Resource Planning

1. Identify most critical vulnerabilities
2. Articulate causes of these vulnerabilities
3. How will climate change affect each vulnerability?
4. Develop portfolios to address vulnerabilities

Bottom-Up





Top-Down

1. Global Emissions Scenarios
2. Global Climate Modeling
3. Downscale Global Future Climate to Regional
4. Model Water Resource Impacts

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Water Supply Management Program 2040

Approach

1. Identify factors which may influence EBMUD system
   - Customer demand
   - Runoff amount
   - Runoff pattern
   - Weather variability
2. Quantify ranges over which factors may vary
3. Stress test existing system against identified factors
   - Quantify how much EBMUD system affected by each factor?
   - What are critical vulnerabilities?
4. Develop solution portfolios that address system vulnerabilities
5. Evaluate Water Supply Portfolios
   - How do portfolios respond to variations in the most critical climate change factors?

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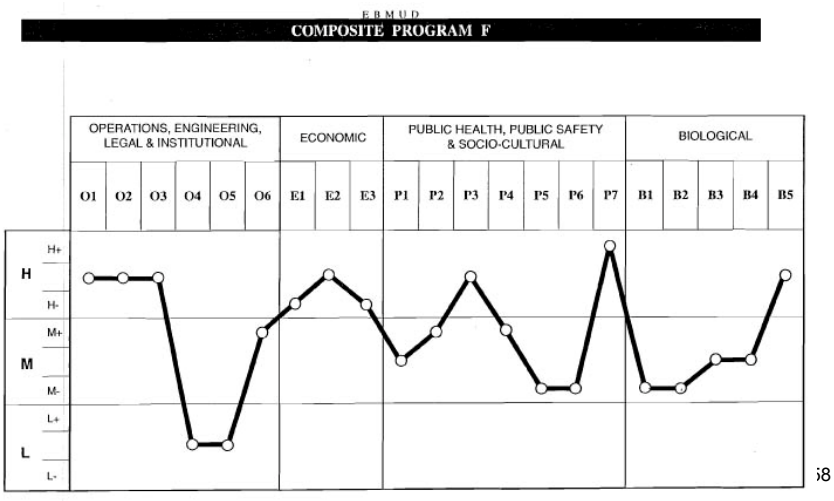
Water Supply Management Program 2040

Portfolio Evaluation - Example



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Water Supply Management Program 2040

Climate Change Approach – Other Agencies

Contra Costa WD	Maintain conservative drought planning sequence. No specific climate change approach.
Santa Clara Valley WD	Maintain conservative drought planning sequence. No specific climate change approach.
SFPUC	Sensitivity analyses for climate change impacts on the Hetch Hetchy system were conducted. Specific details pending.
CVP Operations (USBR)	Comprehensive sensitivity analysis underway, based on a result portfolio using 22 GCM/emissions scenarios.
SWP Operations (DWR)	Sensitivity analysis based on results of DWR's perturbation of historic hydrology.
Metropolitan Water District	Adaptive management approach that includes voluntary water transfers to improve supply reliability, increasing storage capacity.

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Water Supply Management Program 2040

CLC Meeting #2

Review

Water Supply Management Program 2040

Primary Issues Raised

1. Demands Study
   - Account for constantly evolving land use plans
   - Address changes in household size & composition as predicted in Department of Finance projections
   - Address changes in indoor vs outdoor water use
2. Drought Planning Sequence
   - Recommended review of tree ring data to verify that drought planning sequence is adequately conservative
   - Very interested in how WSMP 2040 will address global climate change

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Water Supply Management Program 2040

Primary Issues Raised

3. Evaluation Criteria
   - Consider wide range of regional options for water transfers (supplemental supply components)
   - Develop criteria that are mutually exclusive of each other; results are easier to identify

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Water Supply Management Program 2040

CLC Meeting #3: September 11, 2007

Agenda

1. Water Transfers
2. Range of Components
3. Global Climate Change Approach

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Water Supply Management Program 2040

Evaluation Criteria

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

1. Provide water supply reliability.
2. Utilize current water right entitlements.
3. Promote District involvement in regional ~~sustainable~~ solutions.

Economic

1. Minimize cost to District customers.
2. Minimize drought impact to District customers.
3. Maximize positive impact to local economy.

Public Health, Safety & Community

1. Ensure the high quality of the District's water supply.
2. Minimize adverse sociocultural impacts (including environmental justice).
3. Minimize risks to public health & safety.
4. Maximize security of infrastructure & water supply.

Environmental

1. Preserve & protect the environment for future generations.
2. Preserve & protect biological resources.
3. Minimize carbon footprint.
4. Promote recreational opportunities.

Water Supply Management Program 2040

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3

Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

1. Provide Water Supply Reliability

Exclusion Criteria

1. Must be technically feasible using proven technology.
2. Must meet projected water demands through 2040.
3. Must meet demand during the District's Drought Planning Sequence.
4. Must not be located in areas of unmitigable geologic, hydrologic or toxic/hazardous materials hazards.

4

Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

1. Provide Water Supply Reliability

Evaluation Criteria

1. Minimize the vulnerability & risk of disruptions.
2. Minimize disruptions in water service during construction.
3. Maximize the system's operational flexibility to respond to change.
4. Maximize implementation flexibility to respond to change.
5. Minimize the institutional & legal complexities & barriers.

5

Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

2. Utilize current water right entitlements

Exclusion Criteria

1. Must meet all existing & anticipated water rights permit & license conditions, all dam & reservoir operating permit conditions, including releases for instream & downstream users.

Evaluation Criteria

1. Optimize use of existing water right entitlements.

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Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

3. Promote District involvement in regional solutions

Evaluation Criteria

1. Maximize partnerships & regional solutions.

7

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

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8

Water Supply Management Program 2040

Economic Planning Criteria

1. Minimize cost to District customers

Evaluation Criteria

1. Maximize use of lowest cost water supply options.

2. Minimize the financial cost to the District of meeting customer demands for given level of system reliability.

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Water Supply Management Program 2040

Economic Planning Criteria

2. Minimize drought impact to customers

Exclusion Criteria

1. Must not result in average annual customer shortages exceeding 25% of demand for District design drought.

Evaluation Criteria

1. Minimize customer water shortage costs & District supply augmentation costs.

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Water Supply Management Program 2040

Economic Planning Criteria

3. Maximize positive impact to local economy

Evaluation Criteria

1. Maximize local water supply options.

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

1. Ensure the high quality of the District's water supply

Exclusion Criteria

1. Must ensure that the District's potable water will be able to meet existing & future state & federal primary & secondary drinking water quality standards.
2. Must ensure that the District's non-potable water will be of suitable quality for District use.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

1. Ensure the high quality of the District's water supply

Evaluation Criteria

1. Minimize potential adverse impacts to the public health of District customers.
2. Maximize use of water from the best available source.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

2. Minimize adverse sociocultural impacts

3. Minimize risks to public health & safety

Evaluation Criteria

1. Minimize disproportionate **public health or economic impact** to minority or low-income populations (environmental justice).

2. Minimize adverse impacts to **cultural resources**, including important archaeological, historical, & other cultural sites.

3. Minimize short-term **community** impacts.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

2. Minimize adverse sociocultural impacts

3. Minimize risks to public health & safety

Evaluation Criteria

4. Minimize long-term adverse **community impacts** (e.g., aesthetics, noise, air quality).

5. Minimize adverse **social effects** (e.g., impacts to community character, social cohesion, community features).

6. Minimize **conflicts with existing & planned facilities**, utilities & transportation facilities.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

4. Maximize security of infrastructure & water supply

Evaluation Criteria

1. Minimize the risk of death or injury from the failure of a program component in an earthquake or flood or from other causes.

2. Maximize the protection of supply sources & associated infrastructure.

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

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Water Supply Management Program 2040

Environmental Criteria

1. Preserve & protect the environment for future generations

Evaluation Criteria

1. Minimize adverse impacts on the **environment** (including land, air, water, minerals, flora, fauna, noise, & aesthetics).

2. Minimize **construction & operation effects** on environmentally sensitive resources.

3. Maximize long-term **sustainability** by applying best management & sustainability principles.

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Water Supply Management Program 2040

Environmental Criteria

2. Preserve & protect biological resources

Exclusion Criteria

1. Must not cause a net loss of **wetlands & riparian habitat**.

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Water Supply Management Program 2040

Environmental Criteria

2. Preserve & protect biological resources

Evaluation Criteria

1. Maintain populations or known habitat of **state or federally listed plant or wildlife species** at or above sustaining levels.
2. Minimize the reduction of riverine habitat of state or federally listed fish species & must not cause a net loss of spawning or rearing habitat of native **anadromous fish species**.
3. Minimize impacts to **wetlands**, their values, & other jurisdictional waters of the United States.
4. Minimize **habitat loss** for sensitive & native plant & wildlife species, pristine areas & special habitat features.

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Water Supply Management Program 2040

Environmental Criteria

2. Preserve & protect biological resources

Evaluation Criteria

5. Minimize adverse affects to **native fish** & other native aquatic organisms.
6. Maximize **benefits to fish**, including natural production of anadromous fish.
7. Maximize the likelihood of meeting federal & state ambient **water quality standards** to protect natural resources.
8. Minimize **alterations to water flow** in waterways & reservoirs/lakes that would have an adverse impact on biological resources.

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Water Supply Management Program 2040

Environmental Criteria

3. Minimize carbon footprint

Evaluation Criteria

1. Minimize short term & long term greenhouse gas emissions from construction (e.g., raw material & waste transportation, construction equipment use, site deforestation, carbon emissions from cement production).
2. Maximize energy efficiency associated with operations & maintenance.
3. Maximize CO2-efficient & renewable energy use.
4. Maximize contributions to AB 32 goals.

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Water Supply Management Program 2040

Environmental Criteria

4. Promote recreational opportunities

Evaluation Criteria

1. Minimize adverse impacts to recreation resources, designated parklands, designated wilderness areas, or lands permanently dedicated to open space, particularly rare opportunities & ADA access that are not found in other parts of the region.
2. Provide recreational benefits.

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EBMUD Water Supply Management Program 2040

Building the Water Supply Portfolio
(flip chart)

25

EBMUD Water Supply Management Program 2040

Evaluating the Water Supply Portfolio
(flip chart)

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EBMUD Water Supply Management Program 2040

Water Conservation Component

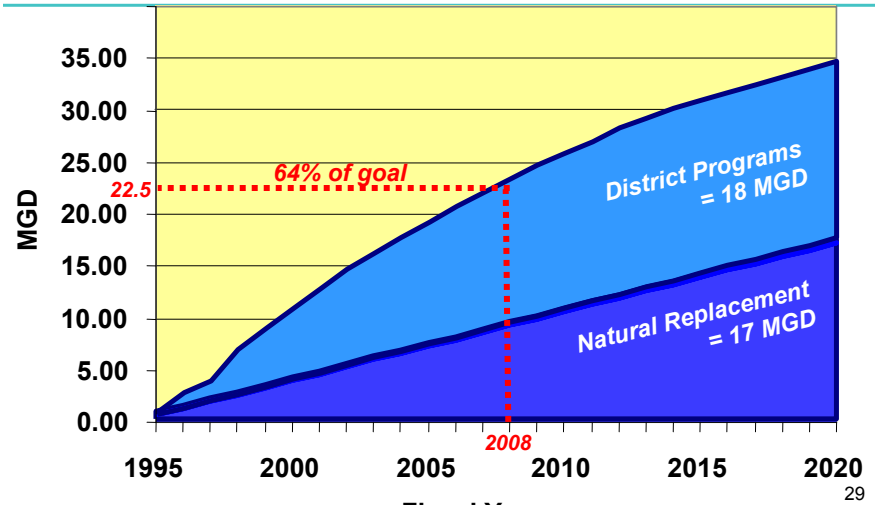
EBMUD Water Supply Management Program 2040

Water Conservation
1995 – 2008

- Programs
  - Water surveys
  - Rebates
  - Education & outreach
  - Codes & regulations
- Water savings estimates
  - 19.5 MGD through 2006
  - 1.5 MGD/yr for 2007 & 2008
  - 22.5 MGD total (District + natural savings)
- Considered completed for WSMP 2040 planning

Water Supply Management Program 2040

Water Conservation Savings Goal
1995-2020



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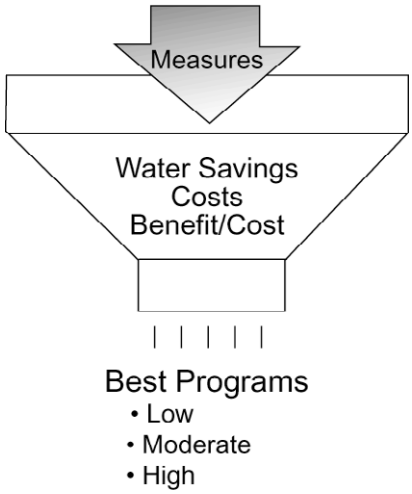
Water Supply Management Program 2040

Water Conservation Evaluation Process



Step 1 Assess Current Demand and Water Savings

Step 2 Assess Future Saving Potential

Step 3 Assemble Program Components

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Water Supply Management Program 2040

Conservation Modeling Approach
2009 & beyond

- Range of analysis: from natural savings to need for water
- Assess technology & behavior
- Assess implementation barriers (e.g. customer acceptance, market saturation, cost)
- Evaluate supply side savings

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Water Supply Management Program 2040

Projected Natural Replacement Savings

- Indoor Plumbing Codes
  - Toilets – 1.6 gal/flush maximum
  - Urinals – 1.0 gal/flush maximum
- Outdoor landscape ordinances
- New technology
- Education

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Water Supply Management Program 2040

Conservation Level Analysis
2009 & beyond

- Analyzed 47 individual conservation measures
  - Examples: Water use surveys, high-efficiency appliances rebates, advanced metering technology, irrigation upgrades
- Projections by indoor & outdoor uses
- Ranked by water savings reliability & implementation costs
- Goes beyond California Urban Water Conservation Council Best Management Practices (BMPs)

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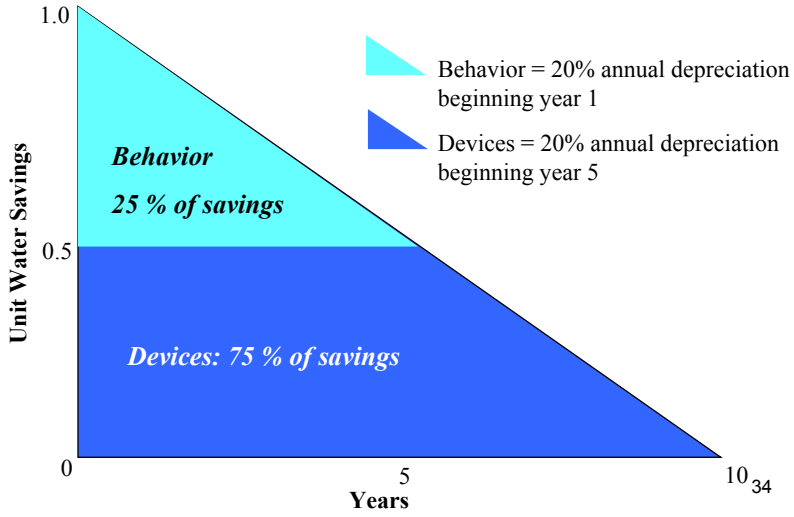
Water Supply Management Program 2040

Conservation Effectiveness Example



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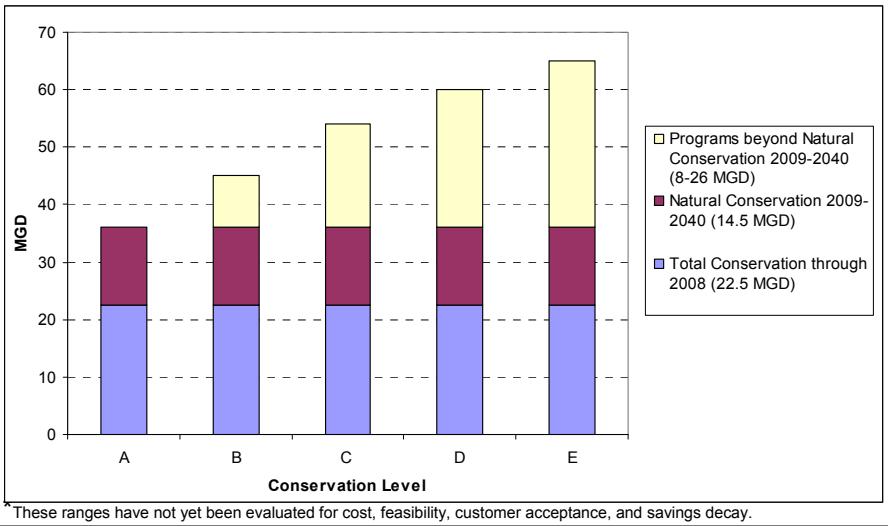
Water Supply Management Program 2040

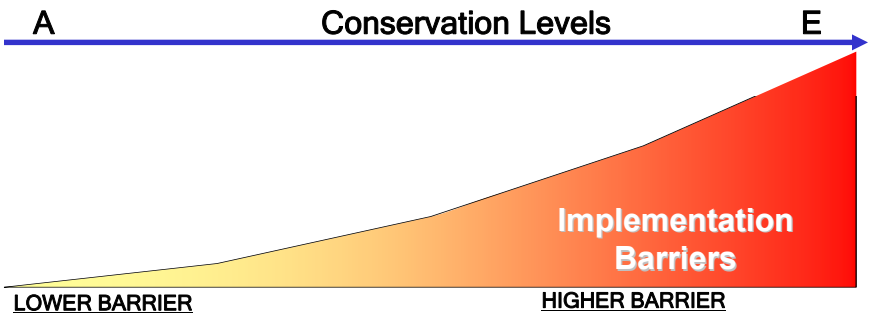
Preliminary Conservation Ranges



*These ranges have not yet been evaluated for cost, feasibility, customer acceptance, and savings decay.

Water Supply Management Program 2040

Conservation Program Evaluation 2009-2040



LOWER BARRIER
- Adopted technology
- More practical
- More voluntary measures
- Lower market saturation
- Lower implementation cost
- Lower savings uncertainty
- Lower demand hardening

HIGHER BARRIER
- Newer technology
- More theoretical
- More mandatory measures
- Higher market saturation
- Higher implementation cost
- Higher savings uncertainty
- Higher demand hardening

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Water Supply Management Program 2040

Conservation Next Steps

- Present conservation components to CLC in December 2007
- Apply WSMP 2040 screening criteria to conservation measures
- Present ranked conservation components at February 2008 workshop
- Assemble conservation components into water supply portfolios
- Update Water Conservation Master Plan

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Water Supply Management Program 2040

Drought Rationing Component

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Water Supply Management Program 2040

Today

- Trends in customer demand
- History of maximum drought reduction capability
- Drought reductions by customer class
- Drought reduction measures

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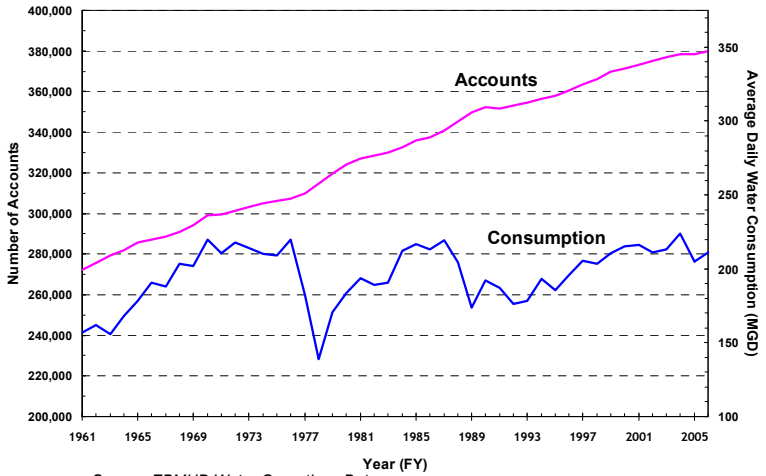
Water Supply Management Program 2040

EBMUD Accounts & Consumption

1961 - 2005



Source: EBMUD Water Operations Data

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Water Supply Management Program 2040

25% Maximum Rationing Criteria - Background

- 1977: 39% rationing achieved
- 1993: 25% goal incorporated into Water Supply Management Plan (WSMP 2020).
- Present: Board Policy 9.03

  Maximum water supply deficiency is 25%

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Water Supply Management Program 2040

Implementation of Policy 9.03

- Assess adequacy of water supplies in April.
- End-of- September (EOS) storage predicted from existing storage, forecasted runoff, & customer demand.
- If EOS storage is inadequate, then drought management is in effect. Consider activating supplemental supplies or customer rationing.

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Water Supply Management Program 2040

Program Types

Stage	April Projection of Storage on September 30	Reduction Goal	Voluntary/ Mandatory
	500 TAF or more	None	
Moderate	500-450 TAF	0 to 15%	Voluntary
Severe	450-300	15 TO 25%	Mandatory
Critical	Less than 300 TAF	25%	Mandatory

TAF – Thousand Acre-Feet

Note: Projected storage includes supplemental supply

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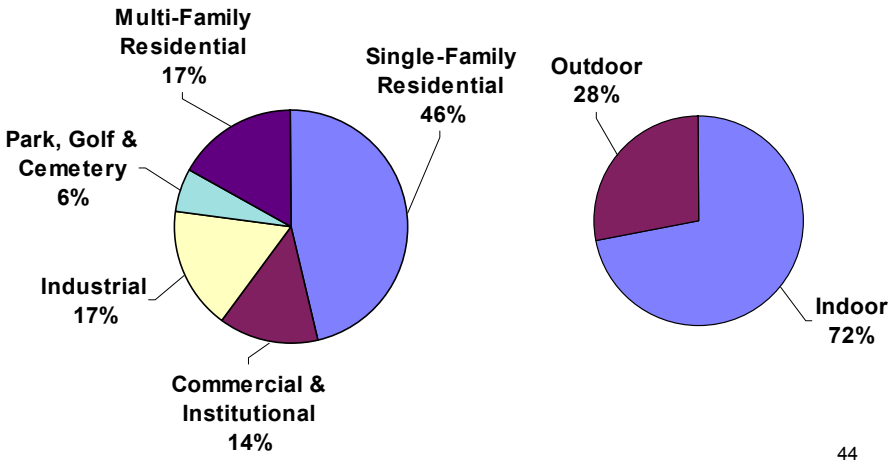
Water Supply Management Program 2040

EBMUD Water Use Characteristics



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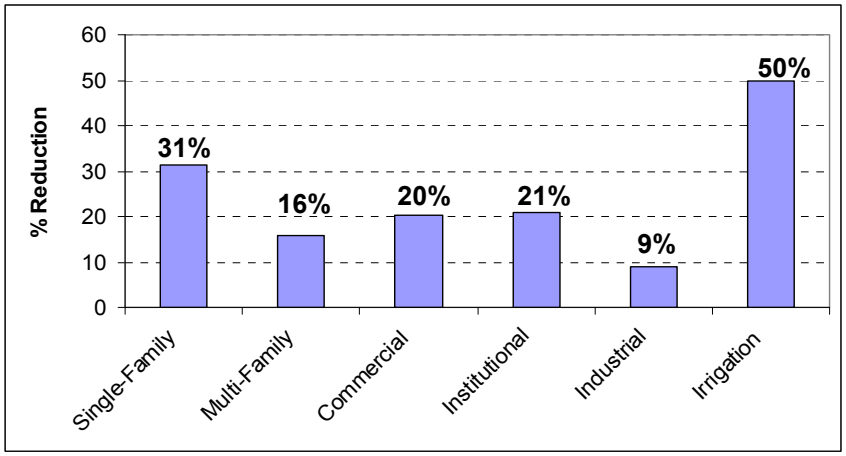
Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 25%



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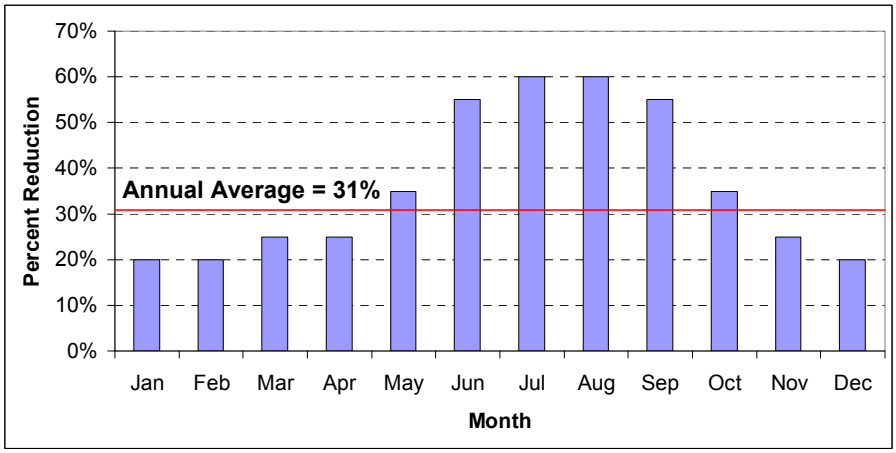
Water Supply Management Program 2040

Single-Family Residential

System-Wide Annual Average = 25%



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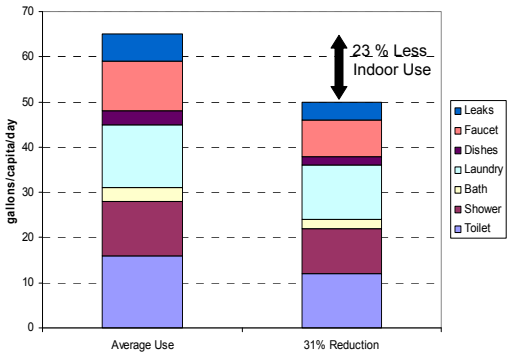
Water Supply Management Program 2040

Single-Family Residential

Indoor Use

Actions

- Fewer flushes / high-efficiency toilets
- Fewer loads / high-efficiency washers
- Use less: bath, dishes, faucets
- Repair leaks quickly



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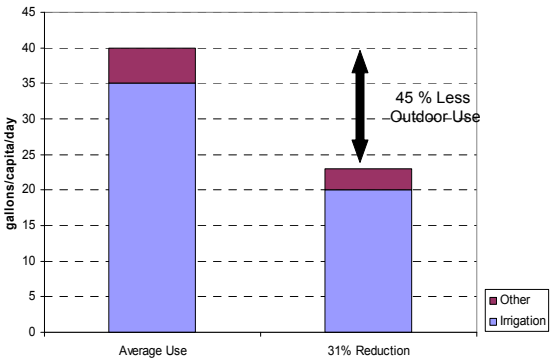
Water Supply Management Program 2040

Single-Family Residential

Outdoor Use

Actions

- Irrigate less than evapotranspiration
- Sweep rather than hose
- No new turf
- No fountains, etc.



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Water Supply Management Program 2040

Planned Rationing for Other Agencies

Zone 7 Water Agency	0%
Metropolitan Water District of So. Cal.	0%
Marin Municipal Water District	20%
San Francisco PUC	Considering 20%
Contra Costa Water District	No Goal
Alameda County Water District	No Goal
Santa Clara Valley Water District	No Policy

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Water Supply Management Program 2040

Next Steps

1. Complete need-for-water analysis at 0% rationing
2. Review & compare customer allocation for 15% & 25%
3. Determine & compare customer cost of water shortage at three levels (0%, 15%, & 25%)
4. Consider range of rationing values in portfolio development

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Water Supply Management Program 2040

Recycled Water Component

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Water Supply Management Program 2040

Recycled Water/Non-Potable Water

1. Existing Raw Water Projects (0.3 mgd)
2. Existing Use at Main WWTP (5.9 mgd)
3. Committed Projects (9.3 mgd)
4. Potential New Projects within EBMUD Service Area
   - Centralized Treatment (Up to 13.5 mgd)
   - Satellite Treatment (Up to 0.9 mgd)
   - Raw Water (Up to 0.3 mgd)
   - Groundwater (non-potable use)
   - Salt Water (fire suppression)
5. Potential Partnerships with Upcountry Agencies (Up to 5.4 mgd)
6. Potential Partnership with Sacramento Area Agencies (Up to 11.6 mgd)

Total Potential New Projects = Up to 14.7 mgd additional in Service Area
= Up to 31.7 mgd additional overall
(including Upcountry & Sacramento areas)

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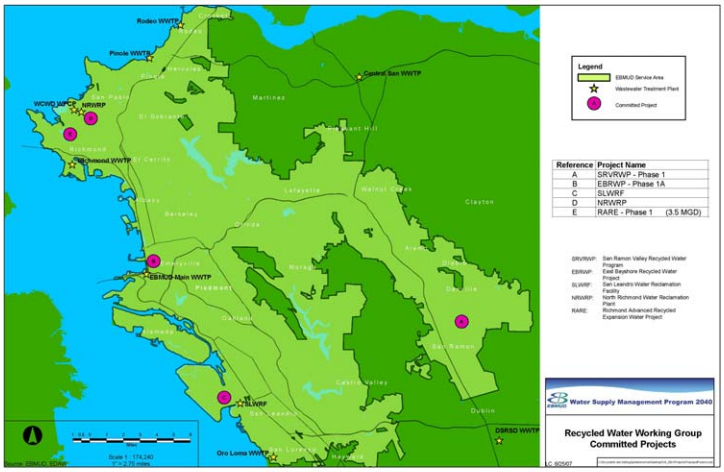
Water Supply Management Program 2040

Committed Projects



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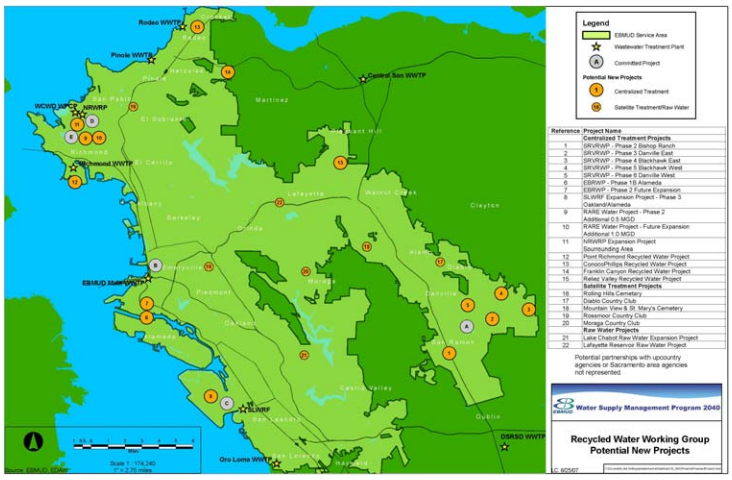
Water Supply Management Program 2040

Potential Projects within EBMUD Service Area



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Water Supply Management Program 2040

Potential Projects within EBMUD Service Area

- Centralized Treatment
- Satellite Treatment
- Raw Water
- Groundwater (non-potable use) *no specific projects identified*
- Salt Water (fire suppression) *no specific projects identified*

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Water Supply Management Program 2040

Centralized Treatment Projects

ConocoPhillips	Up to 4 mgd
East Bay Shore: Phase 1B (Alameda) Phase 2 (Future Expansion)	 0.5 - 1.7 mgd 0.1 - 0.5 mgd
Franklin Canyon	0.2 - 0.3 mgd
North Richmond - Surrounding Area	0.2 - 1.7 mgd
Point Richmond	0.1 mgd
RARE Water Project: Phase 2 Future Expansion	 0.5 mgd 1.0 mgd
Reliez Valley Recycled Water Project	0.1 - 0.2 mgd
San Leandro (Oakland/Alameda)	0.1 - 1.3 mgd
San Ramon Valley (Phases 2 through 6)	2.0 - 2.2 mgd

Total Potential Annual Yield: Up to 15,200 afy (13.5 mgd)

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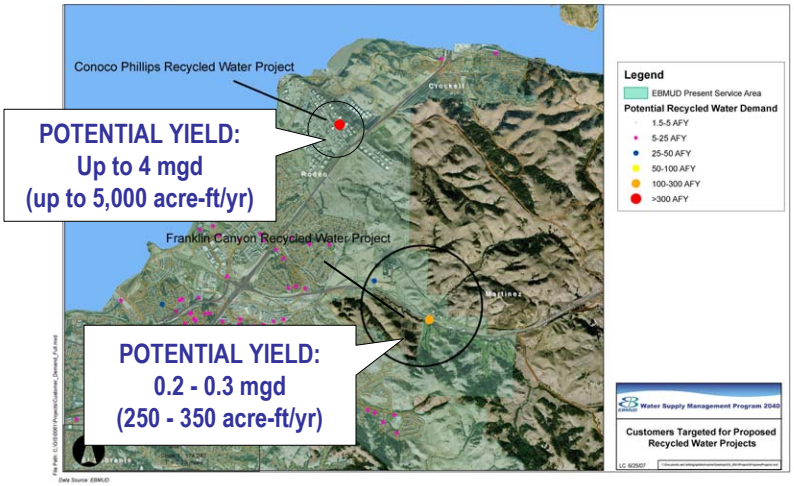
Water Supply Management Program 2040

Rodeo & Hercules Recycled Water Projects



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Water Supply Management Program 2040

Satellite Treatment Projects

Diablo Country Club	0.2 mgd
Moraga Country Club	01. - 0.2 mgd
Mountain View & St. Mary's Cemetery	0.1 - 0.2 mgd
Rolling Hills Cemetery	0.1 - 0.2 mgd
Rossmoor Country Club	0.1 - 0.2 mgd

Total Potential Annual Yield: Up to 1,100 afy (1 mgd)

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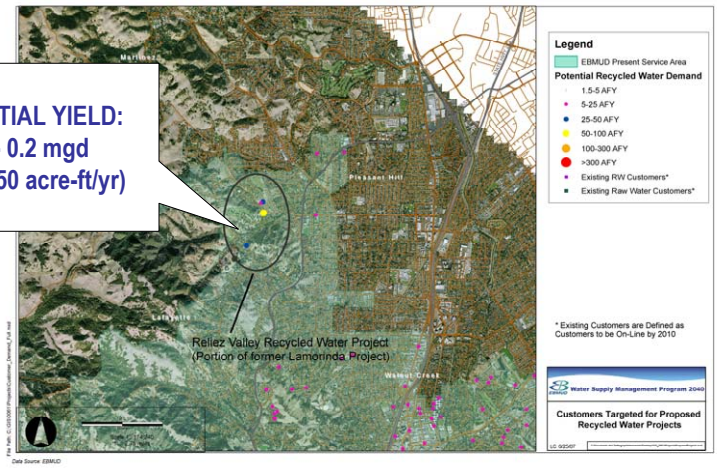
Water Supply Management Program 2040

Reliez Valley Recycled Water Project (Portion of Former Lamorinda Project)

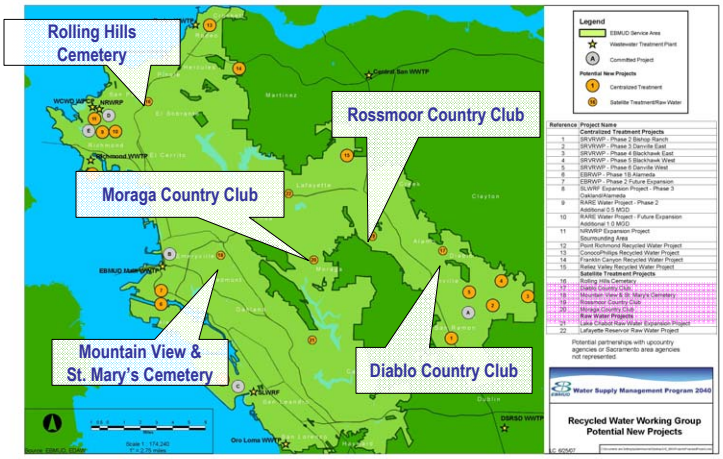
POTENTIAL YIELD:
0.1 - 0.2 mgd
(100 - 250 acre-ft/yr)



59

Water Supply Management Program 2040

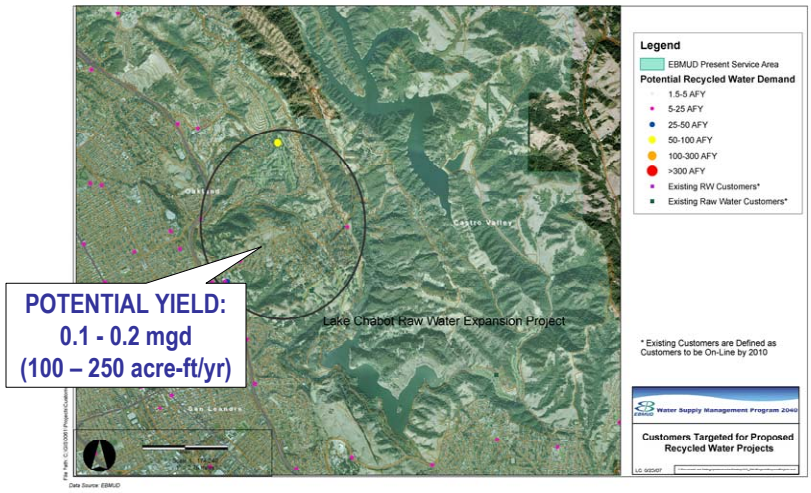
Satellite Treatment Projects



60

Water Supply Management Program 2040

Lake Chabot Raw Water Expansion Project



POTENTIAL YIELD:
0.1 - 0.2 mgd
(100 – 250 acre-ft/yr)

61

Water Supply Management Program 2040

Raw Water Projects

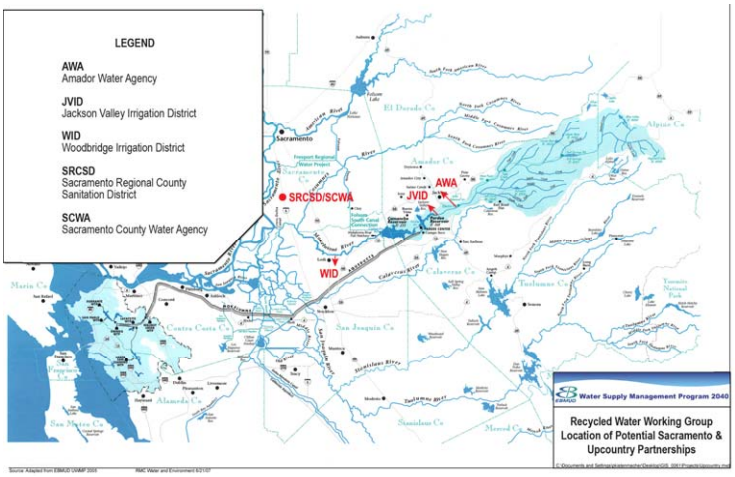
Lafayette Reservoir Raw Water Project	Up to 0.05 mgd
Lake Chabot Raw Water Expansion Project	0.1 - 0.2 mgd

Total Potential Annual Yield: Up to 300 afy (0.3 mgd)

62

Water Supply Management Program 2040

Partnership with Upcountry/Sacramento Agencies



63

Water Supply Management Program 2040

Partnership with Upcountry/Sacramento Agencies

Partner Agency	Potential Yield (annual, mgd or acre-ft/yr)
Amador Water Agency	1 mgd (1,100 acre-ft/yr)
Jackson Valley Irrigation Districts & Amador County Wastewater Agencies	0.2 - 0.3 mgd (200 - 300 acre-ft/yr)
Jackson Valley Irrigation Districts & Amador Water Agency/ future Joint Lake Camanche WWTP	1 mgd (1,100 acre-ft/yr)
Woodbridge Irrigation District	To Be Determined
Sacramento Regional County Sanitation District & Sacramento County Water Agency	**Up to 11.6 mgd (13,000 acre-ft/yr)**
TOTAL	**Up to 17 mgd (19,000 acre-ft/yr)**

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Water Supply Management Program 2040

Amador Canal Water Supply Partnership – An Example

- Partnered with Amador Water Agency
- Provided $4.5M to place small-diameter pipeline in leaking Amador Canal
- District gains temporary use of 15 TAF saved
- Gain disappears as AWA requires use of water saved

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Water Supply Management Program 2040

Next Steps

- Present recycled water components to CLC in December 2007
- Apply WSMP 2040 screening criteria to recycled water components
- Present ranked recycled water components at February 2008 workshop
- Assemble recycled water components into water supply portfolios

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Water Supply Management Program 2040

CLC Meeting #3

Summary

Water Supply Management Program 2040

Meeting Agenda

1. Welcome
2. WSMP 2040 Progress
3. Water Transfers
4. Range of Components
5. Global Climate Change
6. Next CLC Meeting Dates
   - December 3, 2007
   - January 8, 2008 (if necessary)
   - March 11, 2008

Water Supply Management Program 2040

Primary Issues Raised (CLC #3)

Water Transfers

- Delta role in water transfers
- Note economic interdependence between the East Bay and agricultural production (e.g., specialty foods).
- Transfers provide flexible solutions that could solve challenges on multiple sides (e.g., surplus agricultural water, shortages for EBMUD)

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Water Supply Management Program 2040

Primary Issues Raised (CLC #3)

Range of Components

- Consider different rate tiering / pricing as part of a conservation strategy.
- Consider a continuum of conservation strategies from technology to behavior, not one or the other.
- Consider a fine-tuning of rationing levels.

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Water Supply Management Program 2040

Primary Issues Raised (CLC #3)

Global Climate Change

- Water supply may be reduced based on increased regulation (such as AB 32 or Attorney General orders).
- Has any thought been given to what would happen in a long-term drought that affects multiple states?
- Consider use of private groundwater or natural springs for irrigation purposes.
- Global climate change approach & methodology is flexible & relevant to EBMUD water supply sources.

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Water Supply Management Program 2040

Primary Issues Raised (CLC #3)

Evaluation Criteria

- A criteria should be added to reduce reliance on Delta water.
- How much do you consider local economic impact or stimulation? Is there value placed in a component that is investing in the local economy versus some other economy?

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EBMUD Water Supply Management Program 2040

Board of Directors

Workshop #5

November 27, 2007

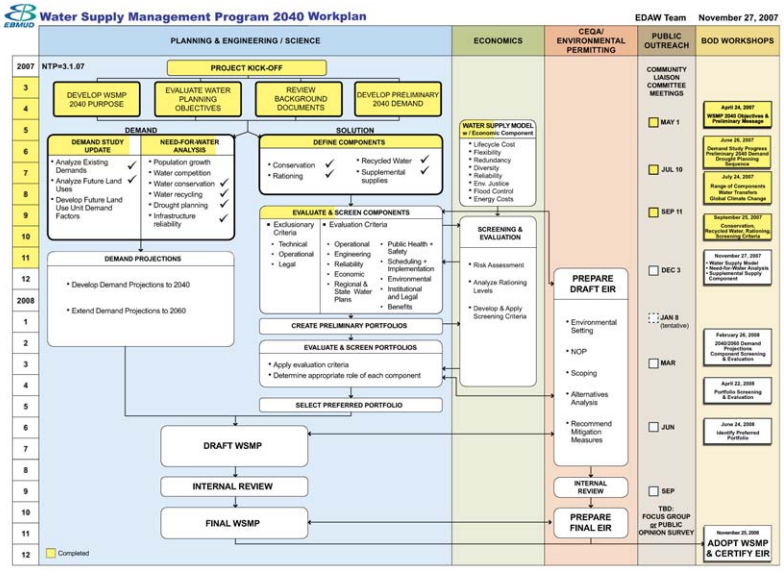
EBMUD Water Supply Management Program 2040

Agenda

1. Project Workplan Update
2. Conservation Program – more detail on programs as requested at BOD#4
3. Water Supply Model
4. Need-for-Water Analysis Results
5. Supplemental Supply Component

2

Water Supply Management Program 2040



3

Water Supply Management Program 2040

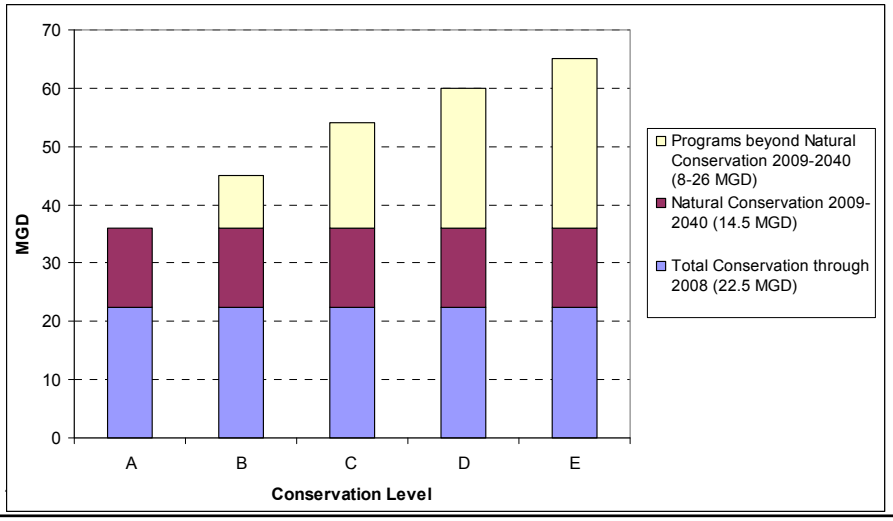
Water Conservation Component

Additional Information

4

Water Supply Management Program 2040

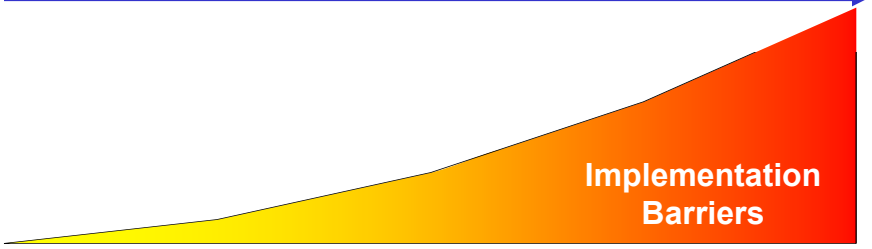
Preliminary Conservation Ranges



Water Supply Management Program 2040

Conservation Program Evaluation 2009-2040

A Conservation Levels E



LOWER BARRIER	HIGHER BARRIER
- Adopted technology	- Newer technology
- More practical	- More theoretical
- More voluntary measures	- More mandatory measures
- Lower market saturation	- Higher market saturation
- Lower implementation cost	- Higher implementation cost
- Lower savings uncertainty	- Higher savings uncertainty

6

Water Supply Management Program 2040

Examples of Indoor Conservation Measures

- Residential water surveys*
- Commercial & industrial surveys*
- Clothes washer rebates*
- Toilet rebates*
- Showerheads, aerators
- Pre-rinse spray valves
- Dishwasher rebates
- Plumbing codes*
- Commercial washer rebates*
- Air-cooled ice machines
- Food steamers
- Hot water on-demand systems
- Commercial equipment upgrades
- Industrial process upgrades
- Digital x-ray technology

** Note: These measures have multiple implementation levels (2 or 3).*

7

Water Supply Management Program 2040

Examples of Outdoor Conservation Measures

- Landscape water surveys*
- Landscape water budgets*
- Landscape ordinances*
- Advanced metering systems*
- Submetering
- Weather-based controllers*
- Leak detection/customer notification*
- Irrigation & landscape upgrades*
- District Pipeline leak repair*
- Graywater
- Pool covers
- Rainwater harvesting

** Note: These measures have multiple implementation levels (2 or 3).*

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Water Supply Management Program 2040

Planning Objectives

Operations, Engineering, Legal & Institutional

1. Provide water supply reliability.
2. Utilize current water right entitlements.
3. Promote District involvement in regional solutions.

Economic

1. Minimize cost to District customers.
2. Minimize drought impact to District customers.
3. Maximize positive impact to local economy.

Public Health, Safety & Community

1. Ensure the high quality of the District's water supply.
2. Minimize adverse sociocultural impacts (including environmental justice).
3. Minimize risks to public health & safety.
4. Maximize security of infrastructure & water supply.

Environmental

1. Preserve & protect the environment for future generations.
2. Preserve & protect biological resources.
3. Minimize carbon footprint.
4. Promote recreational opportunities.

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Water Supply Management Program 2040

Evaluation Criteria

- Example of evaluation criteria that will aid in screening conservation measures:

- Operations, Engineering, Legal, & Institutional
  - Must be technically feasible
  - Minimize institutional & legal complexities & barriers

- Economic
  - Minimize financial cost to the District

- Public Health, Safety & Community
  - Minimize long term adverse community impacts

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Water Supply Management Program 2040

Evaluation Process

Step 1: Screen Conservation Measures

Conservation Measure (examples)	Evaluation Criteria			
	Operations	Economic	Public Health	Environ-mental
Clothes washer rebate	H	M	M	M
Residential surveys I	H	L	H	H
Weather-based controllers	M	M	M	H
Automated Metering Systems I	H	H	H	H
Automated Metering Systems II	H	M	H	M
Pipeline leak repair	L	L	M	M
Commercial dishwasher rebate	H	L	M	H
Graywater	L	L	L	L/M

Note: L=low; M=medium; H=high; scores provided here are for example only; actual screening & evaluation has not been completed.

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Water Supply Management Program 2040

Evaluation Process

Step 2: Cluster Measures by Conservation Level

Conservation Measure (examples)	Conservation Level				
	A	B	C	D	E
Plumbing code	**x**	x	x	x	x
Clothes washer rebate		**x**	x	x	x
Residential surveys I			**x**	x	x
Weather-based controllers			**x**	x	x
Automated Metering Systems I			**x**	x	x
Automated Metering Systems II				**x**	x
Pipeline leak repair				**x**	x
Commercial dishwasher rebate					**x**
Graywater	--	--	--	--	--

Note: Rankings are for example only; actual screening & evaluation has not been completed.

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Water Supply Management Program 2040

Evaluation Process

Step 3: Test Conservation Levels in Portfolios

Conservation Measure (examples)	Conservation Level				
	A	B	C	D	E
Plumbing code	**x**	x	x	x	x
Clothes washer rebate		**x**	x	x	x
Residential surveys I			**x**	x	x
Weather-based controllers			**x**	x	x
Automated Metering Systems I			**x**	x	x
Automated Metering Systems II				**x**	x
Pipeline leak repair				**x**	x
Commercial dishwasher rebate					**x**
Graywater	--	--	--	--	--

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Note: Rankings are for example only; actual screening & evaluation has not been completed.

Water Supply Management Program 2040

Water Supply Portfolios

Building a Portfolio from Project Components

Components			
Conservation	Rationing	Recycled Water	Supp. Supply
A	0%	1	1
B	10%	2	2
C	15%	3	3
D	20%	4	4
E	25%	5	5
		6	6
		7	7
		8	8

Example Portfolio 1

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Water Supply Management Program 2040

Conservation: Next Steps

- Present conservation component to CLC (Dec 2007)
- Apply screening criteria to conservation measures
- Build conservation program levels A through E
- Present screened measures & levels A-E at Feb. 2008 workshop
- Test conservation levels in water supply portfolios

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Water Supply Management Program 2040

Water Supply Model

Overview

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Water Supply Management Program 2040

WSMP: 2020 & 2040

WSMP 2020

- Primary supply = Mokelumne Watershed
- Linear system

WSMP 2040

- Considering multiple supply sources
- More complicated system
- Require flexible portfolios to address increased uncertainty (e.g., climate change)

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Water Supply Management Program 2040

Purpose of Model

- Simulation of water delivery to District service area, upcountry & central valley projects
- Efficient simulation & evaluation of multiple portfolios
- Consideration of diverse portfolios

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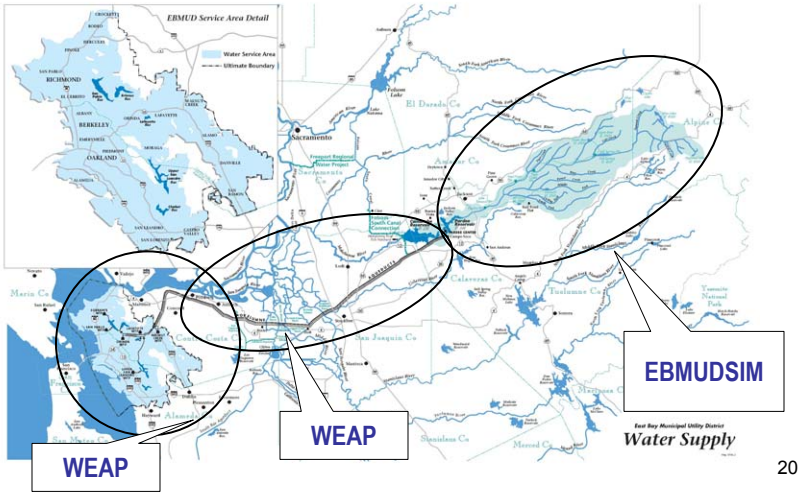
Water Supply Management Program 2040

Model Design

- Incorporate District's existing planning model: EBMUDSIM
- Water Evaluation And Planning (WEAP) System Model – water supply model
- Link models (WEAP & EBMUDSIM) to simulate entire system

Water Supply Management Program 2040

WEAP-EBMUDSIM (W-E) Conceptual Model



20

EBMUD Water Supply Management Program 2040

Model Input

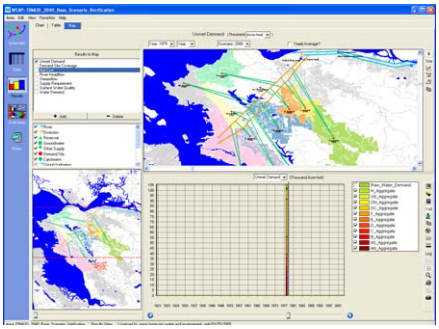
- Fixed Level of Demands at 2040
- Historical Mokelumne River hydrology (1921 – 2003)
- Key infrastructure & operating rules (i.e., Aqueducts, Pardee Reservoir, Freeport, Bayside)
- Joint Settlement Agreement releases to Lower Mokelumne River
- Costs – capital & O&M

21

EBMUD Water Supply Management Program 2040

Model Output

- Water Demand
- Water Supplies & Resources
- Financial Information



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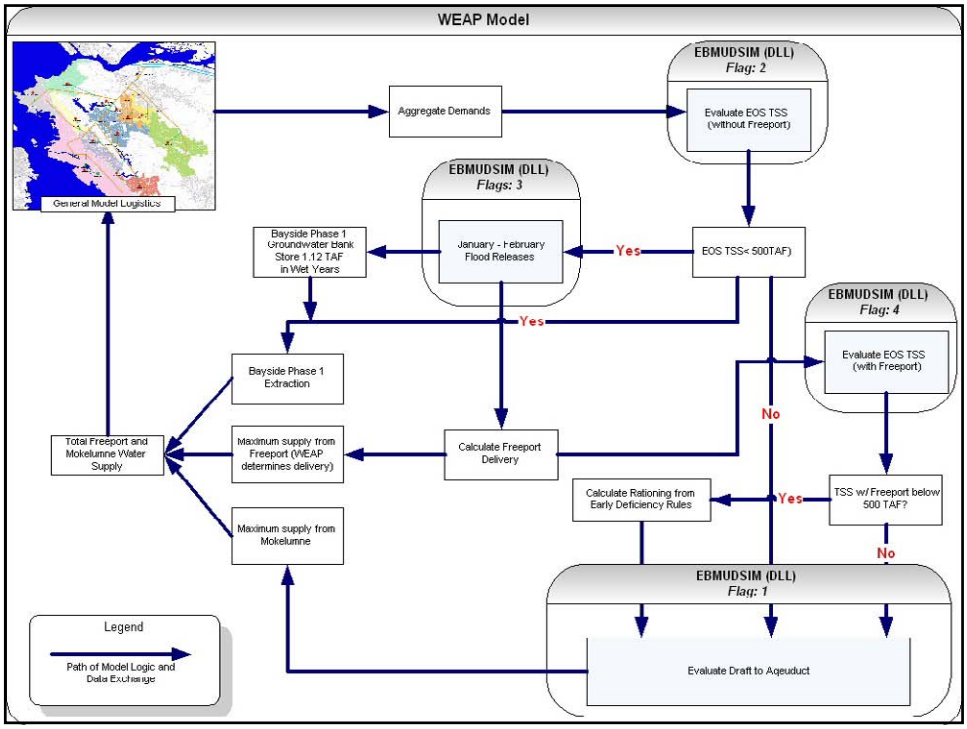

Water Supply Management Program 2040

W-E Model Verification

- Model verified by running both models (EBMUDSIM & W-E) with same components
- Parameters compared include Freeport delivery schedule, Mokelumne draft & rationing

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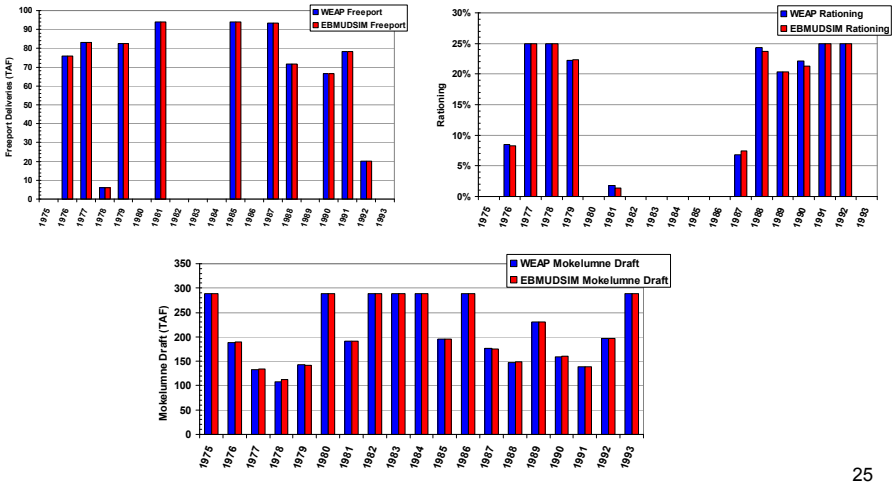
Water Supply Management Program 2040

W-E Model Verification



25

Water Supply Management Program 2040

Need for Supplemental Water Analysis

Modeling Assumptions & Results

26

Water Supply Management Program 2040

Need for Water Analysis Assumptions - Demands

- Used midpoint of the range for the 2040 preliminary demand estimate (258MGD)
- Preliminary demand estimate assumes:
  - Recycled water projects through 2010
  - Conservation
    - District programs through 2008
    - Natural replacement through 2020

(40 MGD)

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Water Supply Management Program 2040

Need for Water Analysis Assumptions - Supply

- Current Pardee & Camanche water rights applicable to entire modeling period
- Full use of water rights senior to the District's
- CVP deliveries per water supply contract via Freeport Regional Water Project
- Bayside Groundwater Phase I is active

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Water Supply Management Program 2040

Freeport Regional Water Project

- Modeled according to physical capacity and contractual constraints
- CVP deliveries are triggered when End-of-Sept. Total System Storage < 500 TAF
- Once triggered, FRWP deliveries commence on March 1st at maximum rate, 100 MGD

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Water Supply Management Program 2040

Need for Supplemental Water Supplies in 2040 During DPS

Maximum rationing	Gross Annual Average Customer Demand (MGD)	Need for Water over 3 years (TAF)[b]	Average Annual Need for Water (MGD)
25%	298[a]	**150**	45
15%	298	**216**	64
10%	298	**248**	73
0%	298	**306**	91

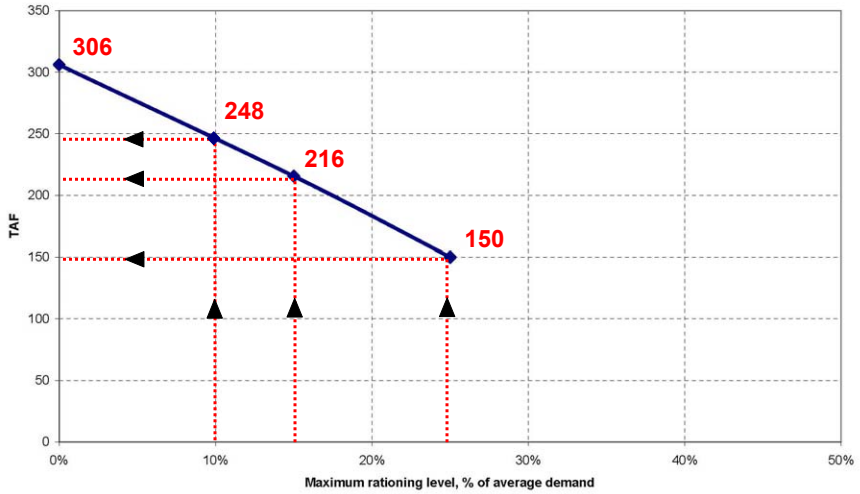
a. *Includes 258 MGD + 40MGD for ongoing recycling, conservation & natural replacement*

b. *Estimated values*

30

Water Supply Management Program 2040

Need for Supplemental Water in 2040



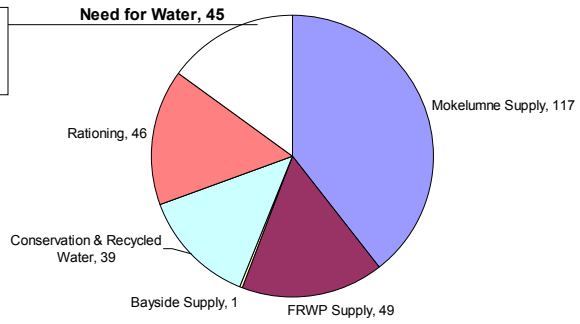
Water Supply Management Program 2040

2040 Water Supply
25% Maximum Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
25% maximum rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



32

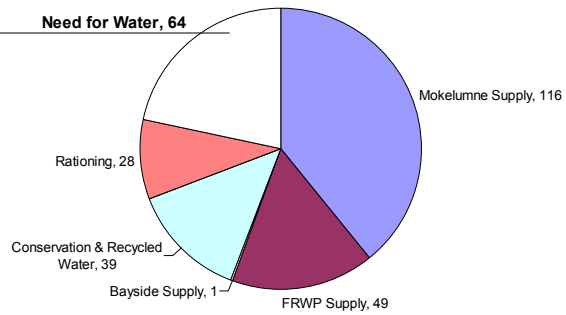
Water Supply Management Program 2040

2040 Water Supply
15% Maximum Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
15% maximum rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



33

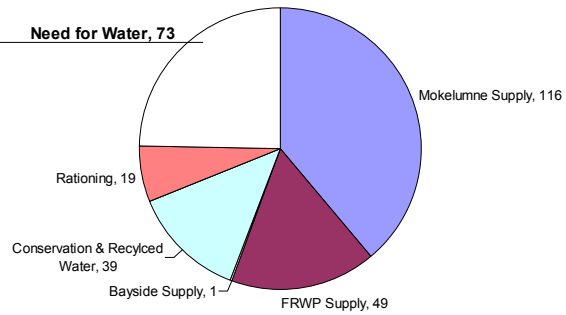
Water Supply Management Program 2040

2040 Water Supply
10% Maximum Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
10% maximum rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



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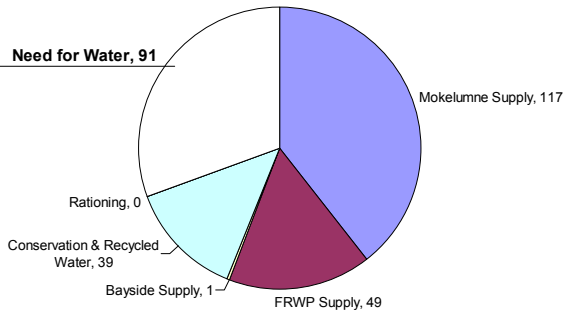
Water Supply Management Program 2040

2040 Water Supply
No Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
No rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



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Water Supply Management Program 2040

Water Supply Model - Next Steps

1. Conduct climate change sensitivity analysis by varying parameters from Need for Water analysis
2. Incorporate financial/economic features in the model
3. Insert final 2040 Demand Projections
4. Develop portfolios from component projects
5. Use WEAP model as part of the portfolio analysis process

EBMUD Water Supply Management Program 2040

Supplemental Supply Component

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EBMUD Water Supply Management Program 2040

Supplemental Supply

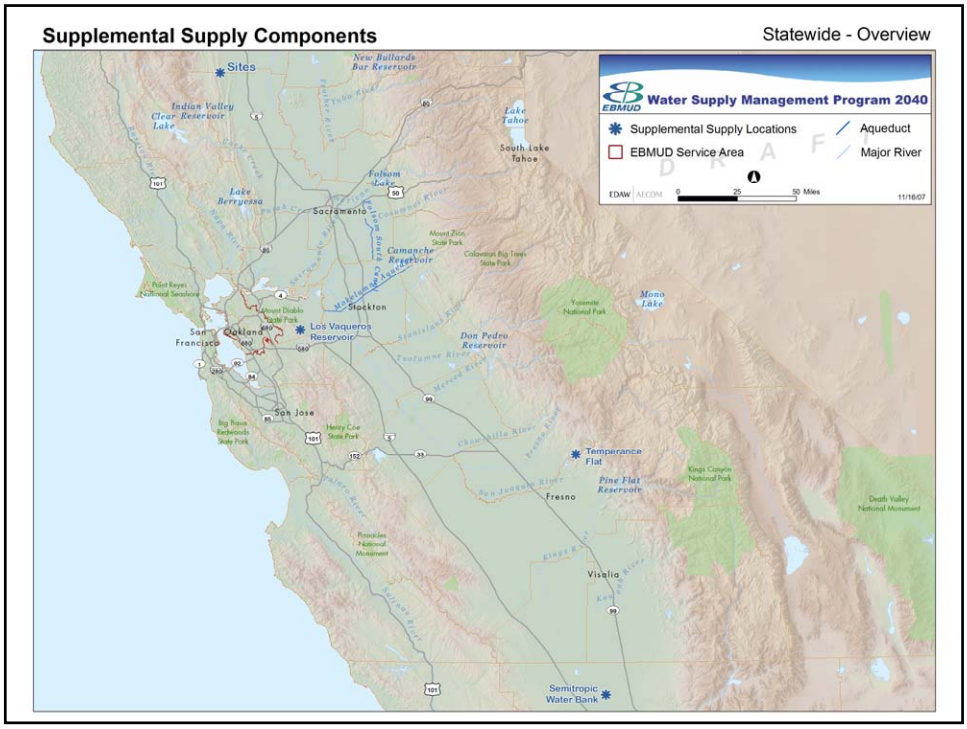
Statewide
- Sites Reservoir
- Temperance Flat Reservoir
- Expanded Los Vaqueros Reservoir
- Semitropic Groundwater Bank

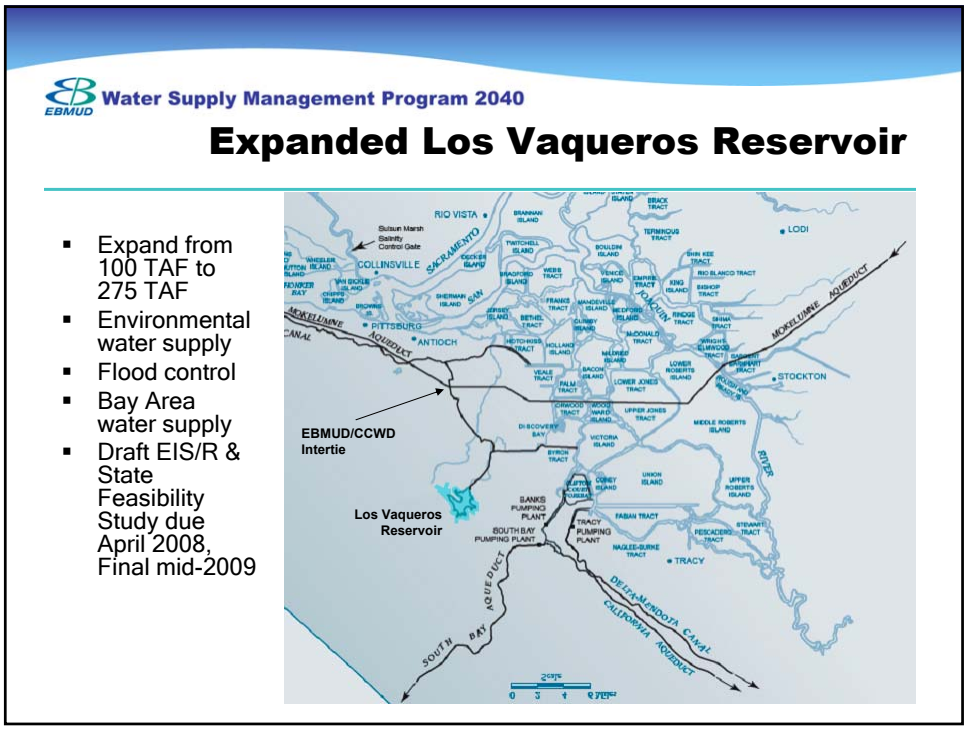
Central Valley
- Bixler/Delta Diversion
- Duck Creek
- Sacramento Basin Groundwater Banking/Exchange
- San Joaquin Basin Groundwater Banking/Exchange

Local (East Bay)
- Bayside GW – Phase 2
- Bollinger Canyon
- Buckhorn Canyon
- Cull Canyon
- Curry Canyon
- Fog Capture
- Kellogg Canyon
- Low Energy Application for Desalination (LEAD) at C&H Sugar
- Off-Shore Desalination
- Regional Desalination
- Water Bags

Upcountry
- Camanche
- Inter-Regional Conjunctive Use Project
- Lower Bear
- Middle Bar
- Pardee

← **Water Transfers** (short or long-term) →


Supplemental Supply Components
Statewide - Overview
Water Supply Management Program 2040
Supplemental Supply Locations
EBMUD Service Area
Aqueduct
Major River
Sites
Los Vaqueros Reservoir
Temperance Flat
Semitropic Water Bank
Sacramento
Stockton
Oakland
San Jose
Fresno
Visalia


Water Supply Management Program 2040
Expanded Los Vaqueros Reservoir
Expand from 100 TAF to 275 TAF
Environmental water supply
Flood control
Bay Area water supply
Draft EIS/R & State Feasibility Study due April 2008, Final mid-2009
EBMUD/CCWD Intertie
Los Vaqueros Reservoir
RIO VISTA
COLLINSVILLE
PITTSBURG
ANTIOCH
STOCKTON
LODI
TRACY
MOKELUMNE AQUEDUCT
SOUTH BAY AQUEDUCT
DELTA-MENDOTA CANAL
CALIFORNIA AQUEDUCT

Water Supply Management Program 2040

Semitropic Water Bank

- Up to 70 TAF
- Dry year supplemental supply
- Water banking/water transfer arrangement
- Send EBMUD wet year transfer water to Semitropic
- During dry years, EBMUD would divert water via Freeport & Semitropic would use banked share

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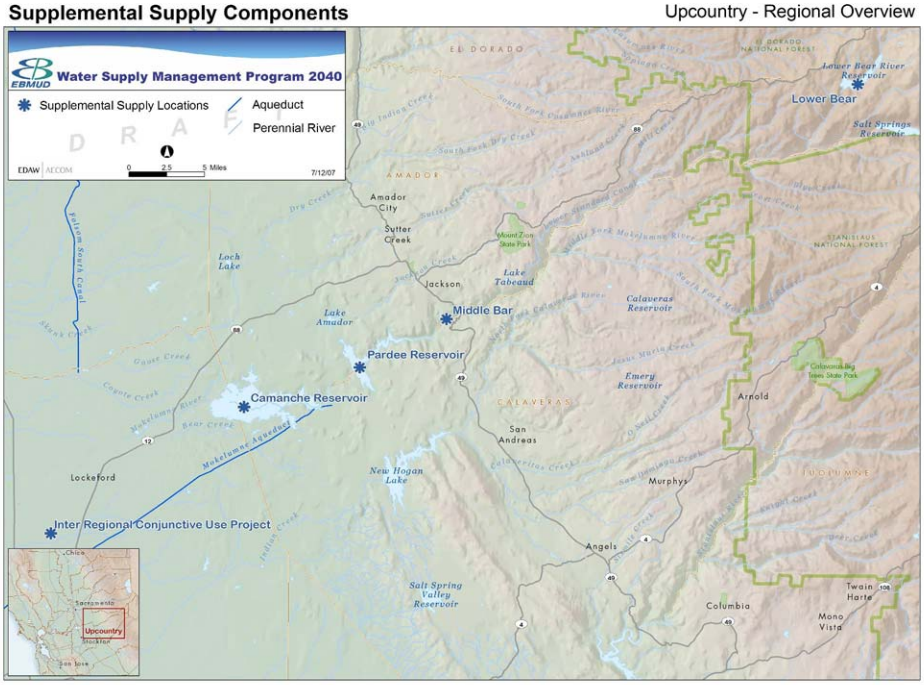
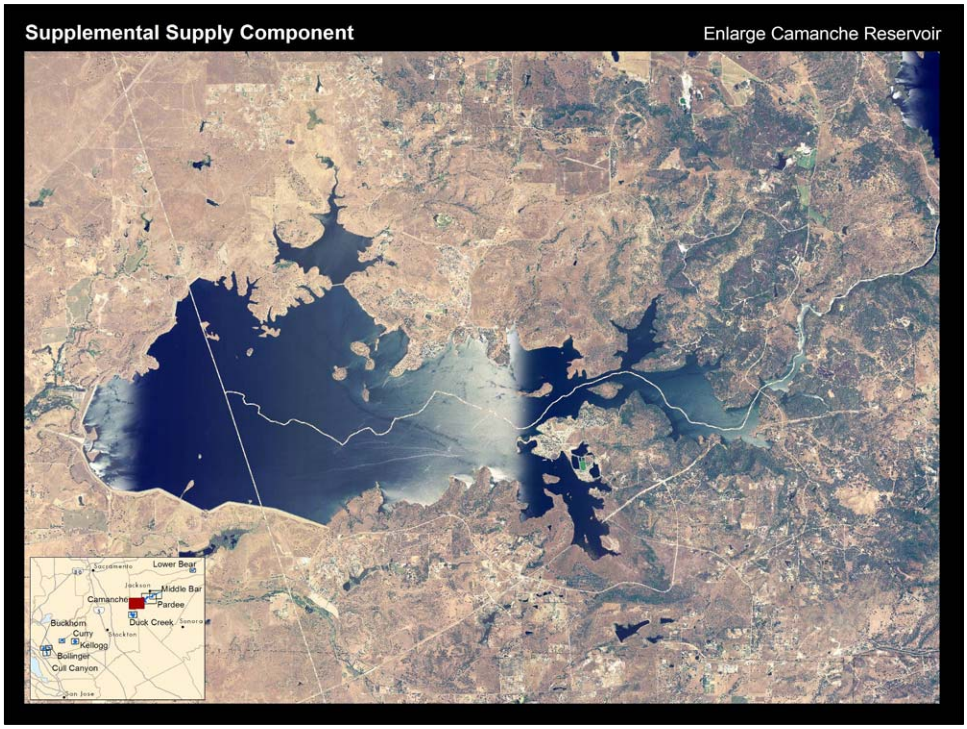
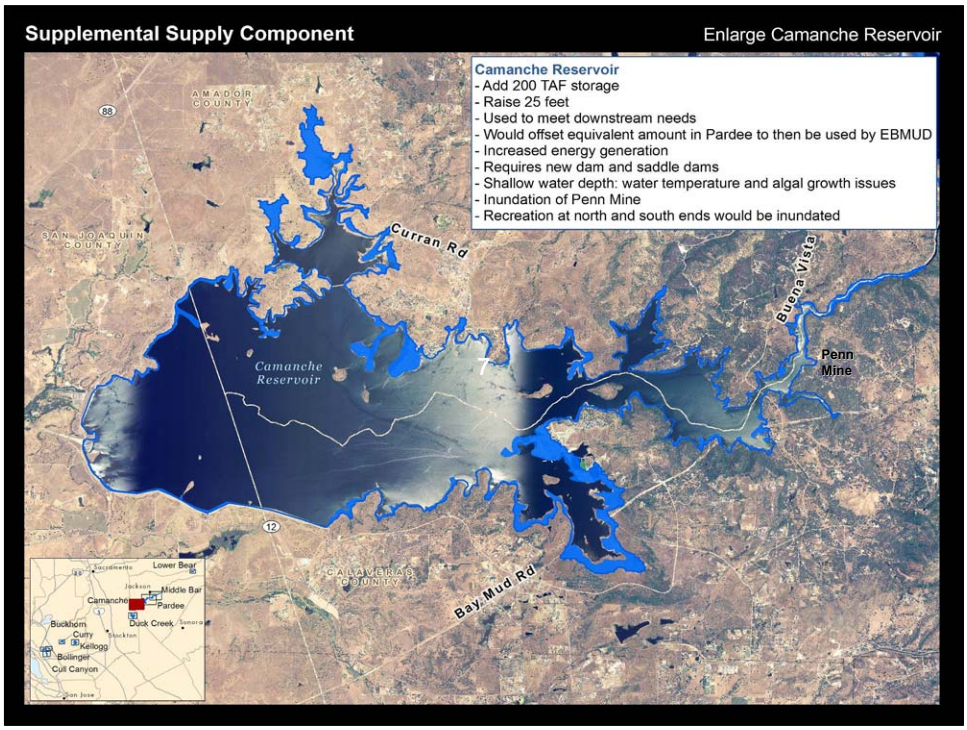
Supplemental Supply Components — Upcountry - Regional Overview



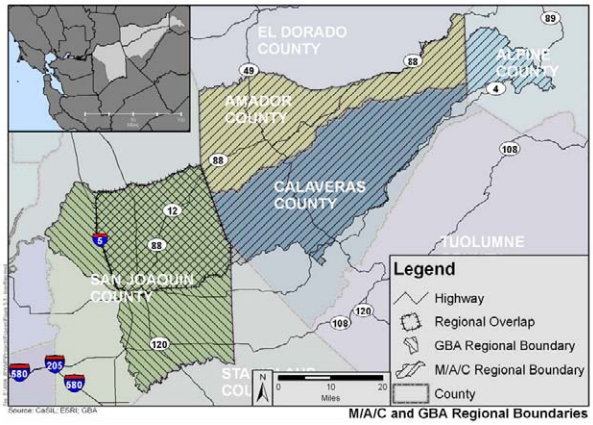

Supplemental Supply Component
Enlarge Camanche Reservoir
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bellinger
Cull Canyon


Supplemental Supply Component
Enlarge Camanche Reservoir
Camanche Reservoir
- Add 200 TAF storage
- Raise 25 feet
- Used to meet downstream needs
- Would offset equivalent amount in Pardee to then be used by EBMUD
- Increased energy generation
- Requires new dam and saddle dams
- Shallow water depth: water temperature and algal growth issues
- Inundation of Penn Mine
- Recreation at north and south ends would be inundated
AMADOR COUNTY
SAN JOAQUIN COUNTY
CALAVERAS COUNTY
Curran Rd
Buena Vista
Bay Mud Rd
Camanche Reservoir
Penn Mine
88
12
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bellinger
Cull Canyon

EBMUD Water Supply Management Program 2040

Inter-Regional Conjunctive Use (IR-CUP)

- Annual production: 10 – 50 TAF
- Groundwater banking, exchange & transfer
- Amador, Calaveras & San Joaquin Counties & EBMUD
- Storage in E San Joaquin GW Basin



M/A/C and GBA Regional Boundaries

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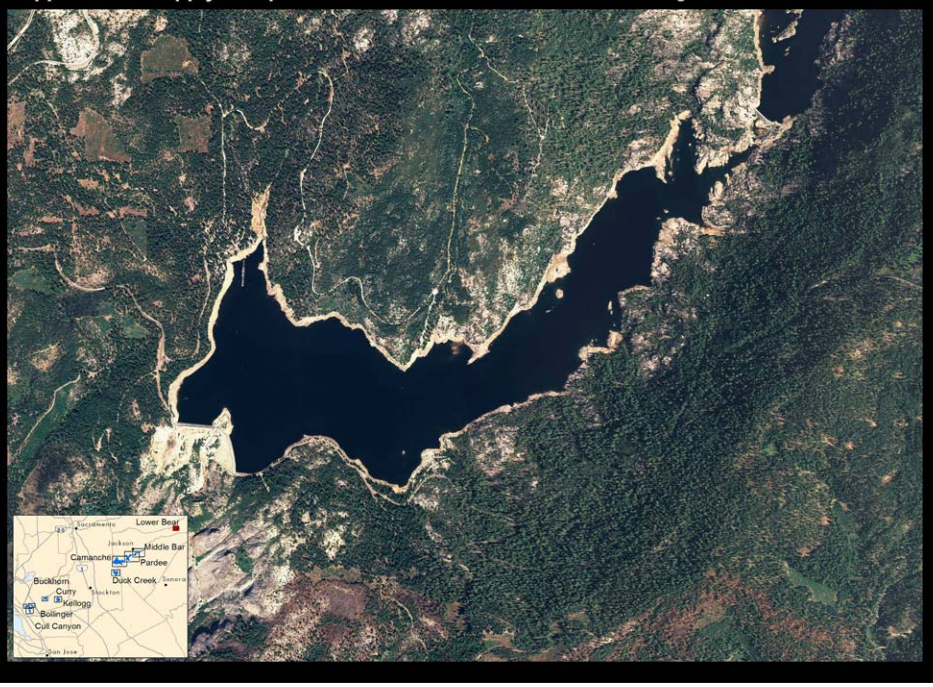
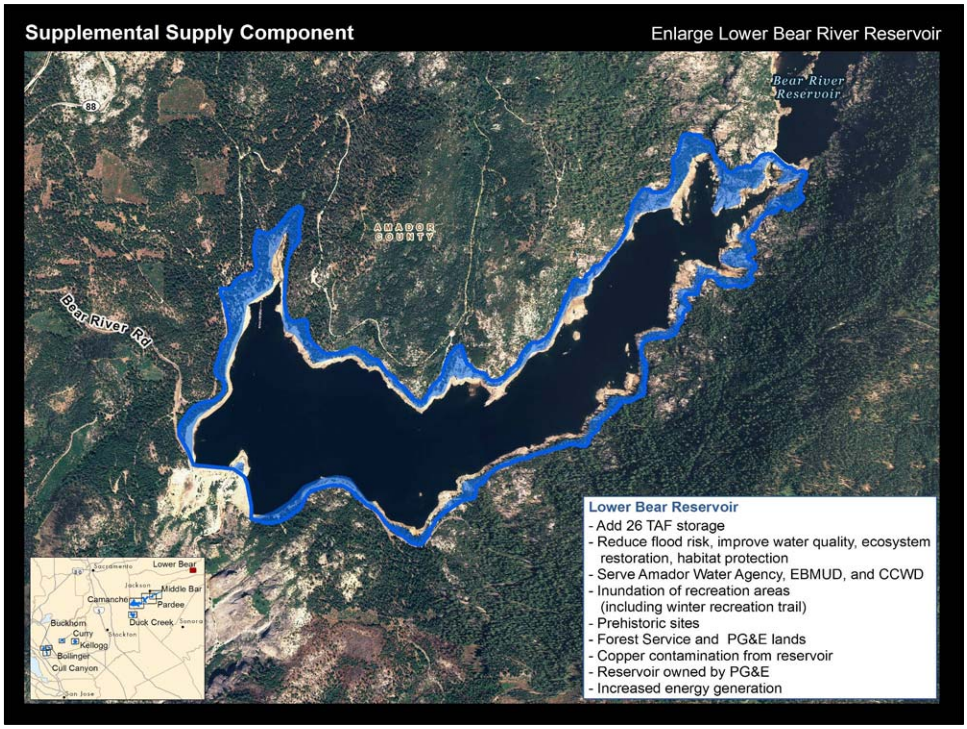
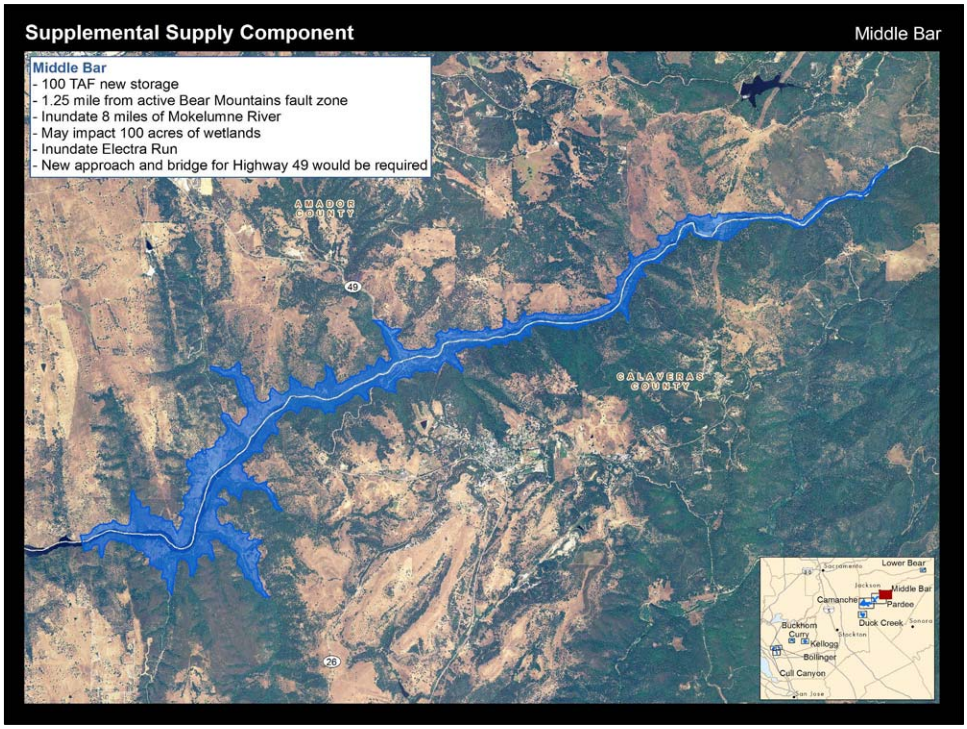
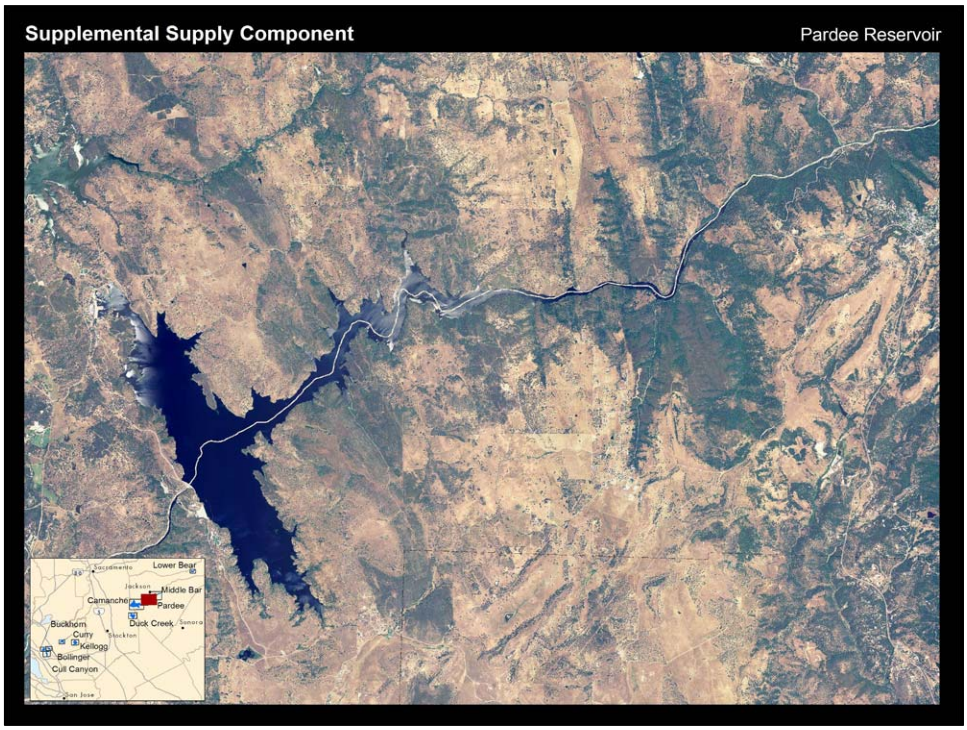
Supplemental Supply Component — Enlarge Lower Bear River Reservoir

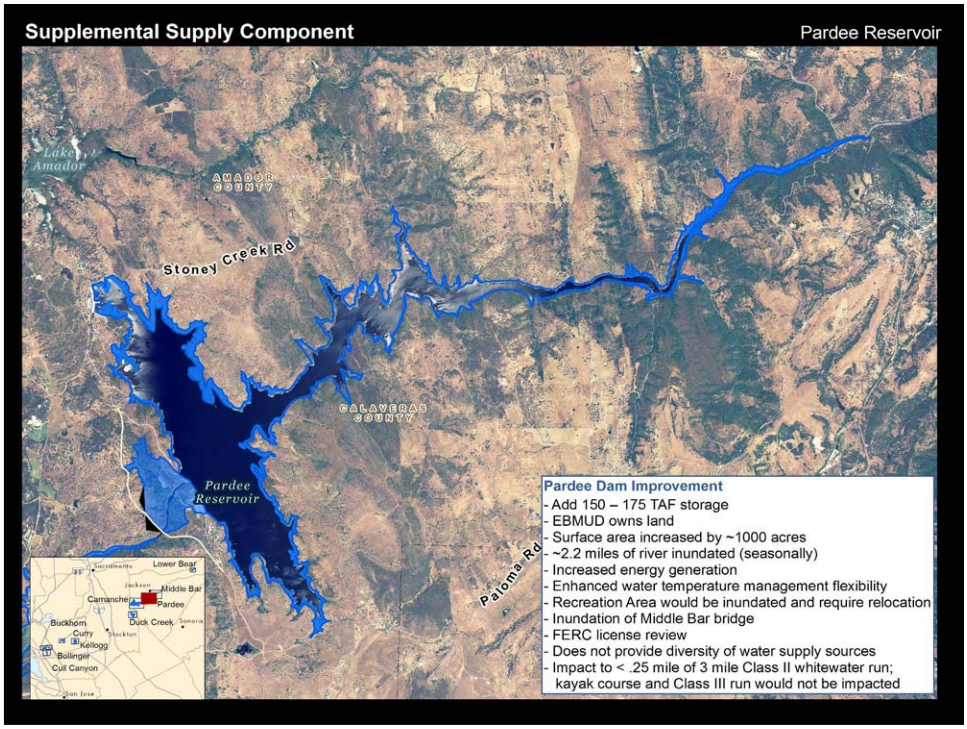


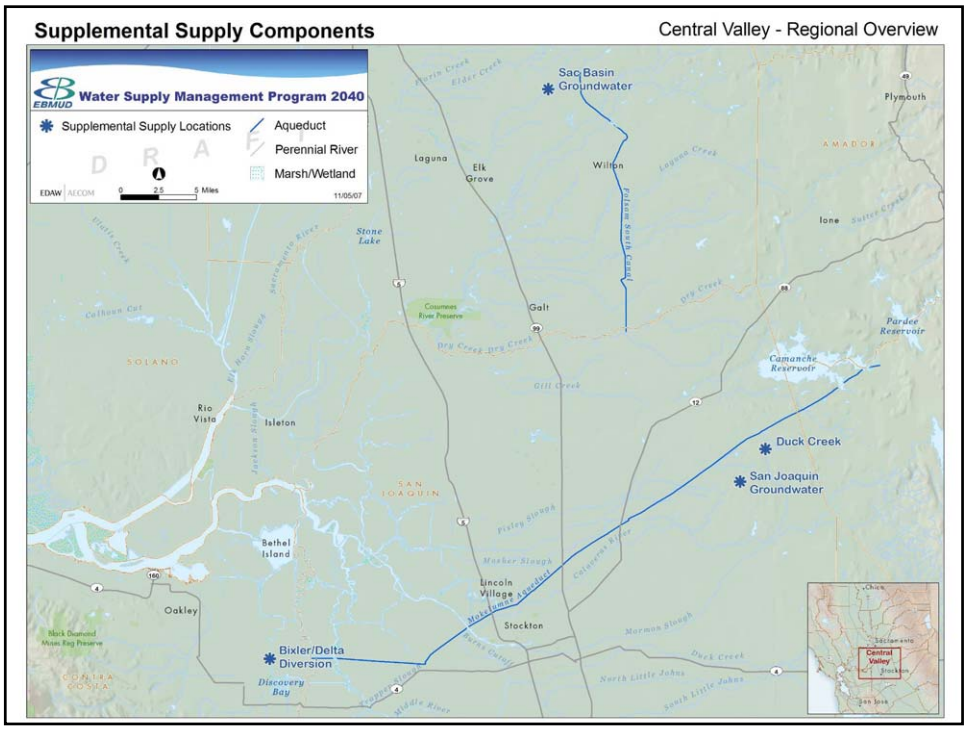

Supplemental Supply Component
Enlarge Lower Bear River Reservoir
Bear River Reservoir
AMADOR COUNTY
Bear River Rd
Lower Bear Reservoir
- Add 26 TAF storage
- Reduce flood risk, improve water quality, ecosystem restoration, habitat protection
- Serve Amador Water Agency, EBMUD, and CCWD
- Inundation of recreation areas (including winter recreation trail)
- Prehistoric sites
- Forest Service and PG&E lands
- Copper contamination from reservoir
- Reservoir owned by PG&E
- Increased energy generation
Lower Bear
Middle Bar
Pardee
Camanche
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon
Duck Creek


Supplemental Supply Component
Middle Bar
Lower Bear
Middle Bar
Pardee
Camanche
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon
Duck Creek


Supplemental Supply Component
Middle Bar
Middle Bar
- 100 TAF new storage
- 1.25 mile from active Bear Mountains fault zone
- Inundate 8 miles of Mokelumne River
- May impact 100 acres of wetlands
- Inundate Electra Run
- New approach and bridge for Highway 49 would be required
AMADOR COUNTY
CALAVERAS COUNTY
49
26
Lower Bear
Middle Bar
Camanche
Pardee
Duck Creek
Buckhorn
Curry
Kellogg
Bellinger
Cull Canyon


Supplemental Supply Component
Pardee Reservoir
Lower Bear
Middle Bar
Camanche
Pardee
Duck Creek
Buckhorn
Curry
Kellogg
Bellinger
Cull Canyon


Supplemental Supply Component
Pardee Reservoir
Lake Amador
AMADOR COUNTY
Stoney Creek Rd
CALAVERAS COUNTY
Pardee Reservoir
Paloma Rd
Pardee Dam Improvement
- Add 150 – 175 TAF storage
- EBMUD owns land
- Surface area increased by ~1000 acres
- ~2.2 miles of river inundated (seasonally)
- Increased energy generation
- Enhanced water temperature management flexibility
- Recreation Area would be inundated and require relocation
- Inundation of Middle Bar bridge
- FERC license review
- Does not provide diversity of water supply sources
- Impact to < .25 mile of 3 mile Class II whitewater run; kayak course and Class III run would not be impacted
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Components
Central Valley - Regional Overview
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
Marsh/Wetland
DRAFT
Sac Basin Groundwater
Plymouth
Laguna
Elk Grove
Wilton
Ione
Stone Lake
Galt
Pardee Reservoir
Camanche Reservoir
SOLANO
Rio Vista
Isleton
Duck Creek
San Joaquin Groundwater
SAN JOAQUIN
Bethel Island
Lincoln Village
Stockton
Oakley
Bixler/Delta Diversion
Discovery Bay
CONTRA COSTA
AMADOR

EBMUD Water Supply Management Program 2040

Bixler/Delta Diversion

- Existing but unused facilities: 2 pumping plants & intake canal
- If treated on-site, requires new facility but allows unrestricted distribution
- If not treated on-site, restricted distribution options

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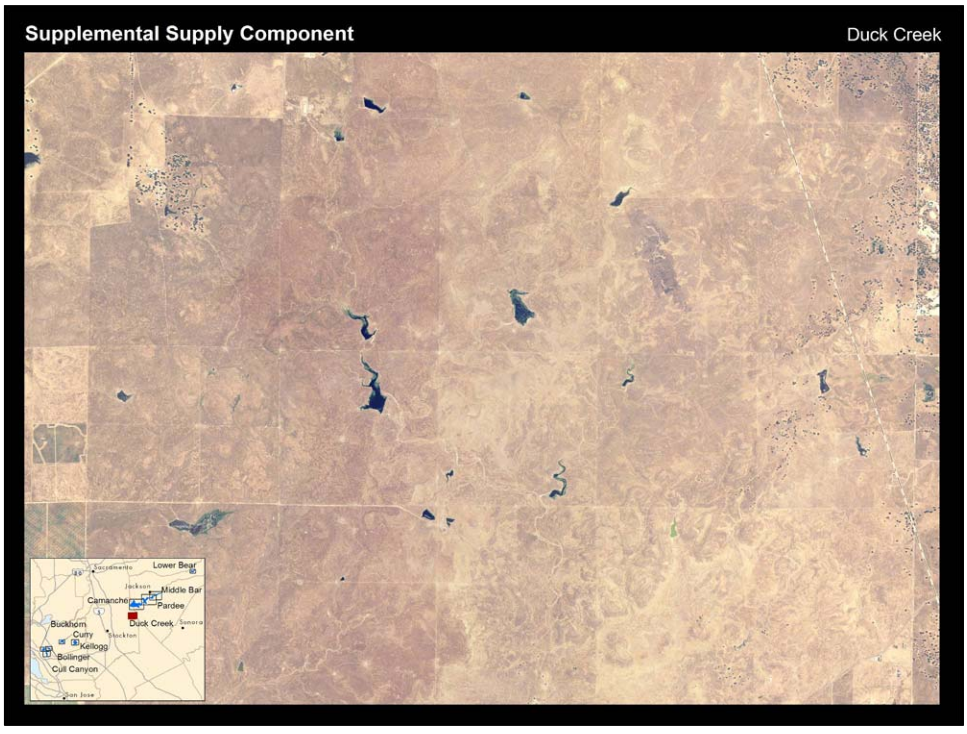

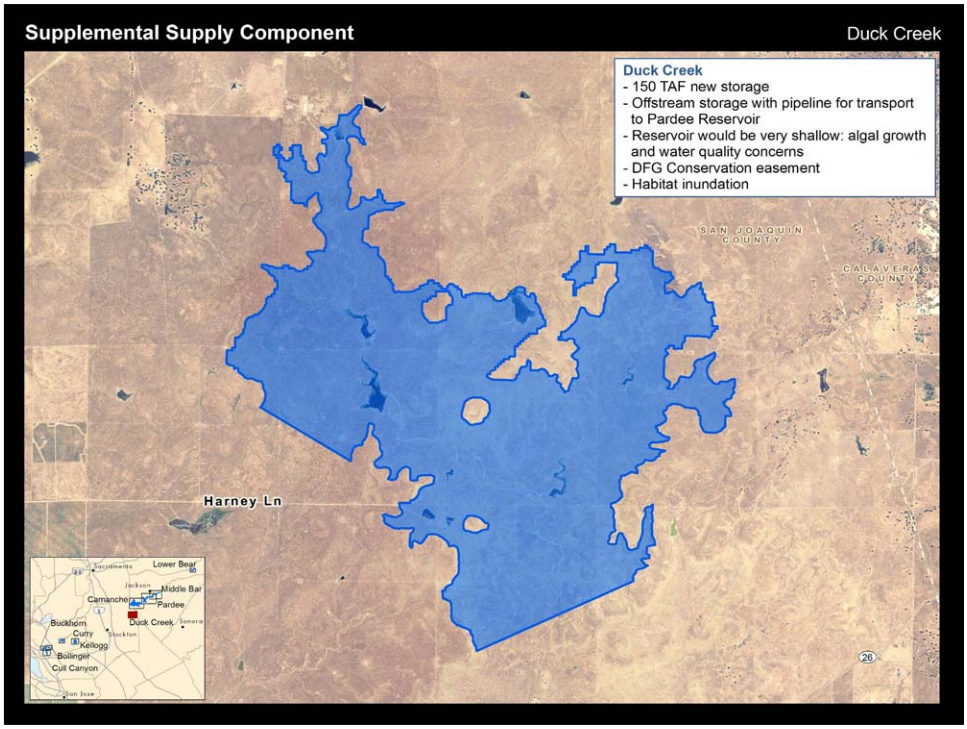

EBMUD Water Supply Management Program 2040

Sacramento County GW Banking/Exchange

- EBMUD, Sacramento County Water Agency, Sacramento Groundwater Authority
- Groundwater Storage Potential: TBD
- Convey via Freeport Regional Water Project
- Components: recharge ponds, extraction wells, treatment plant, pipeline, pump station, intertie
- Institutional challenges

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Water Supply Management Program 2040

San Joaquin County GW Banking/Exchange

- Approximately 2 Mil AF of storage potentially available
- The "10-well project" considered
  - Injecting 40 TAF per year
  - Extracting 25 TAF per year (dry years)
- Direct Recharge Project (not in-lieu recharge)
- Diversion at Mokelumne Aqueduct (rather than a new diversion structure downstream)
- Recharge via injection wells
- Extracted water back to EBMUD system via the same recharge distribution system pipeline & via same wells
- Institutional challenges

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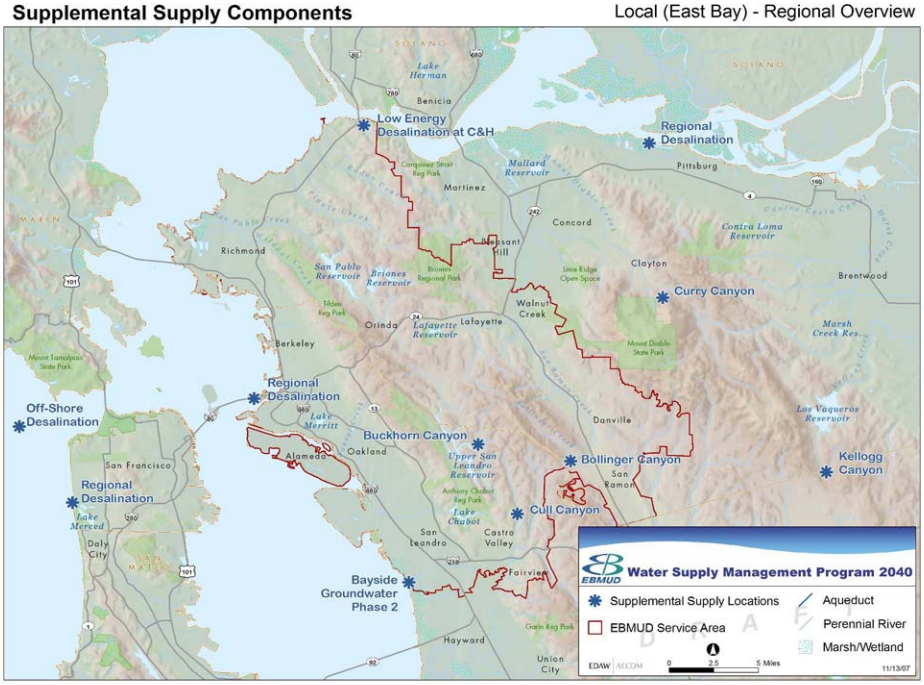
Supplemental Supply Components Local (East Bay) - Regional Overview



EBMUD Water Supply Management Program 2040

Bayside Groundwater Phase 2

- 5 – 10 TAF (dry years)
- Up to 4 additional wells, transmission pipeline, expanded monitoring system & treatment
- Concerns regarding groundwater basin impacts, water quality, & environmental justice
- New EIR required

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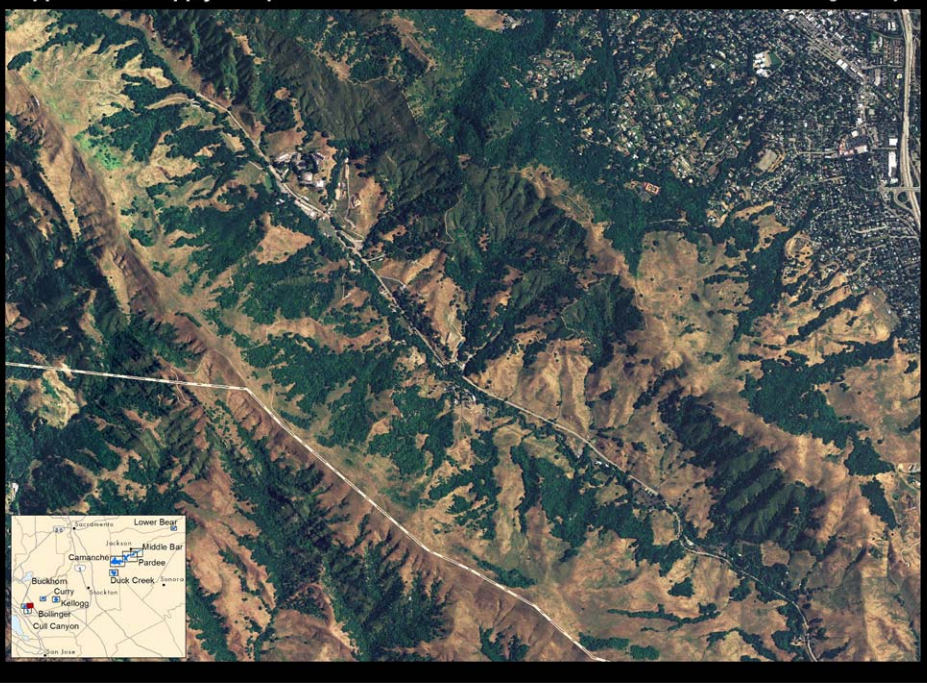
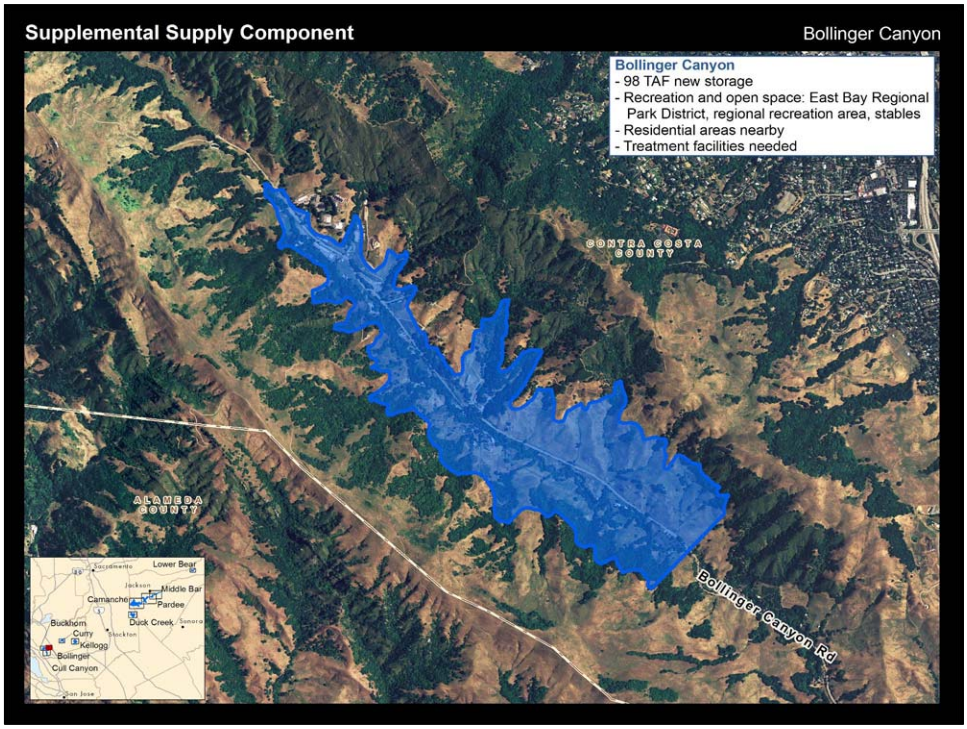
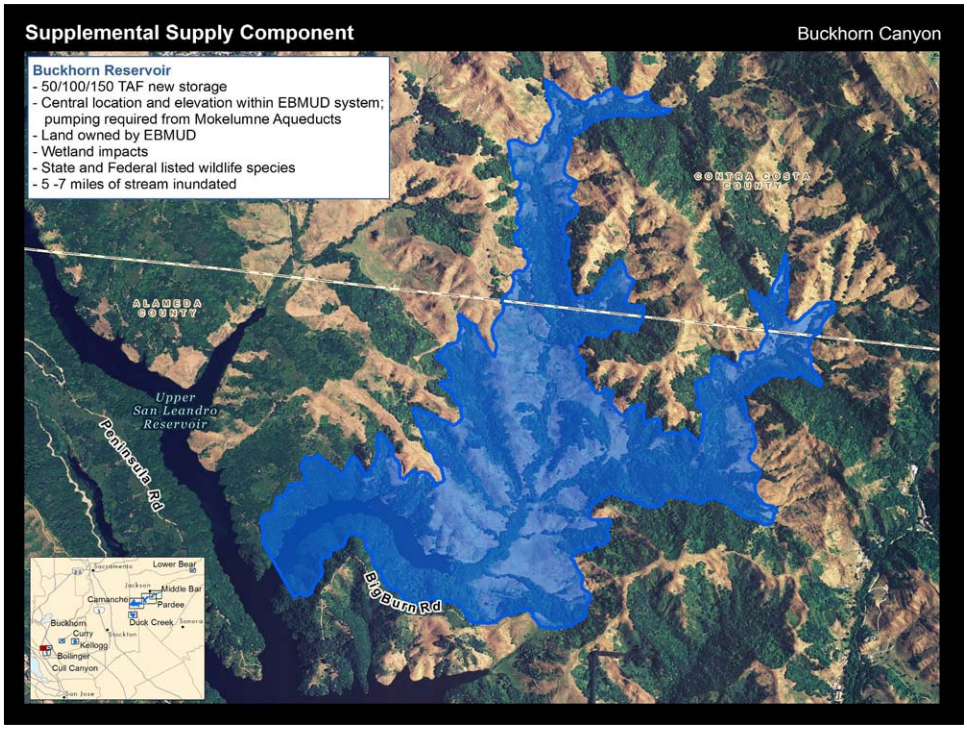
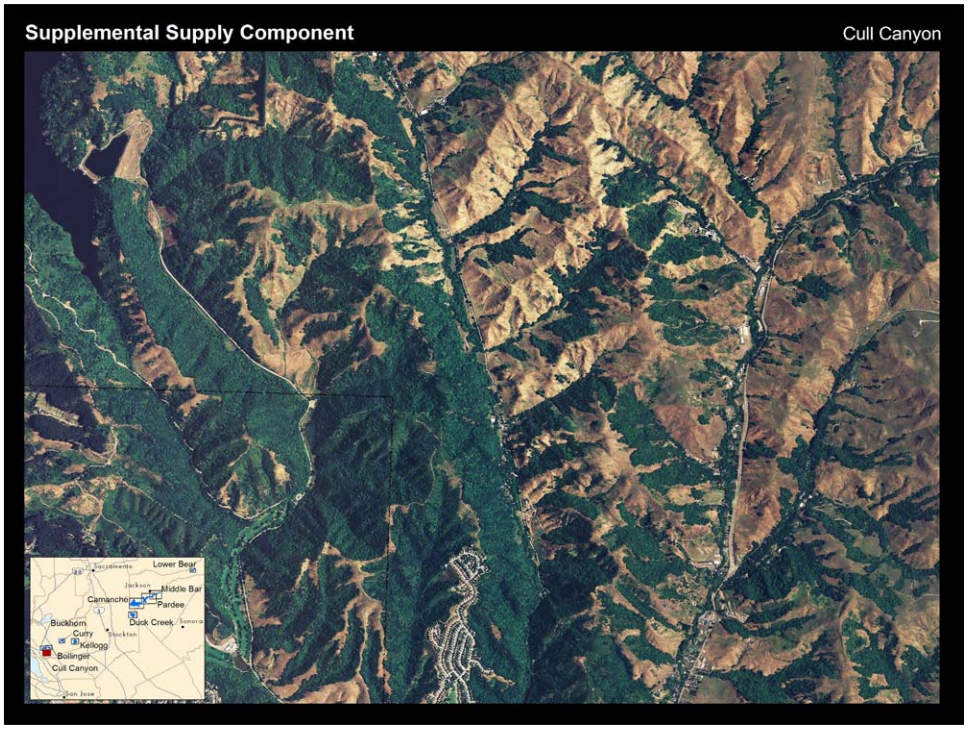
Supplemental Supply Component Bollinger Canyon

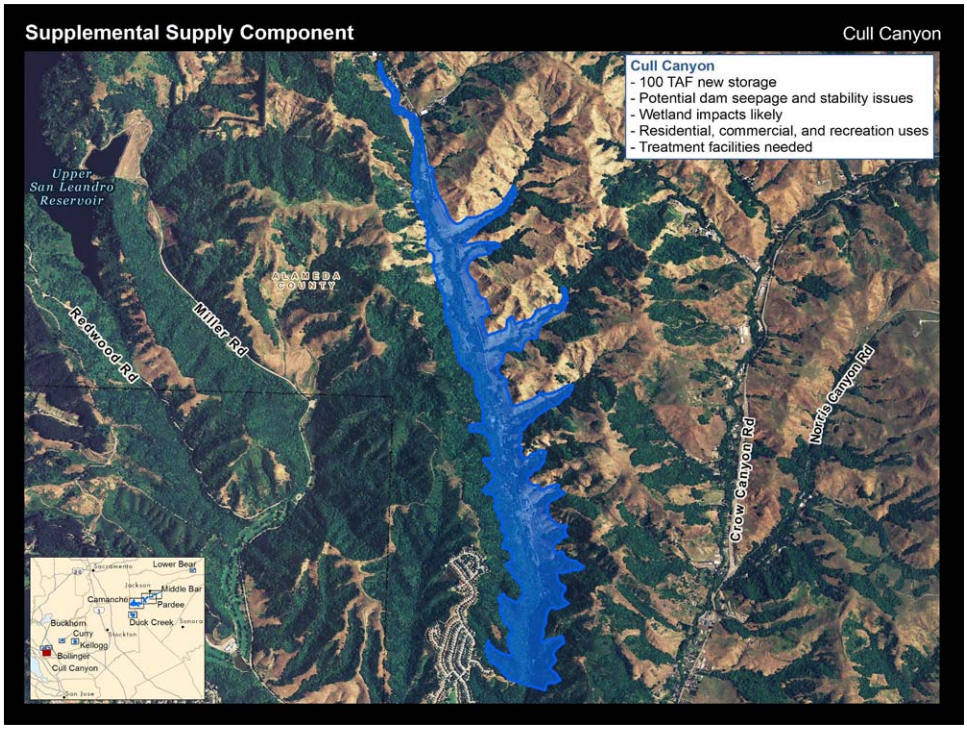



Supplemental Supply Component
Bollinger Canyon
Bollinger Canyon
- 98 TAF new storage
- Recreation and open space: East Bay Regional Park District, regional recreation area, stables
- Residential areas nearby
- Treatment facilities needed
CONTRA COSTA COUNTY
ALAMEDA COUNTY
Bollinger Canyon Rd
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon

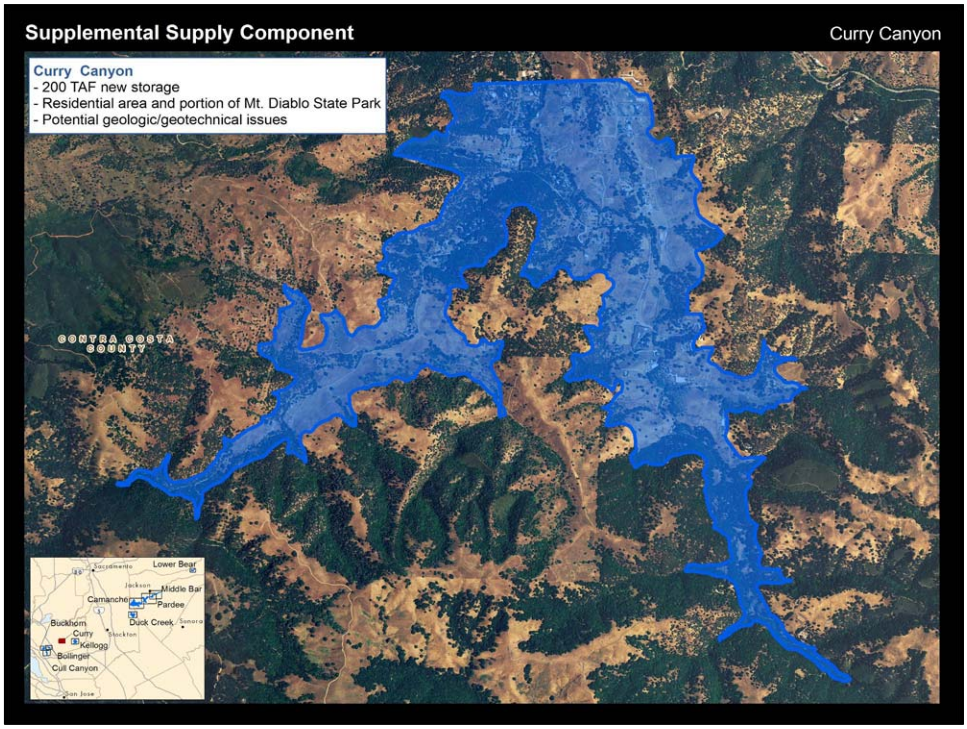

Supplemental Supply Component
Buckhorn Canyon
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Buckhorn Canyon
Buckhorn Reservoir
- 50/100/150 TAF new storage
- Central location and elevation within EBMUD system; pumping required from Mokelumne Aqueducts
- Land owned by EBMUD
- Wetland impacts
- State and Federal listed wildlife species
- 5 -7 miles of stream inundated
CONTRA COSTA COUNTY
ALAMEDA COUNTY
Upper San Leandro Reservoir
Peninsula Rd
Big Burn Rd
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon

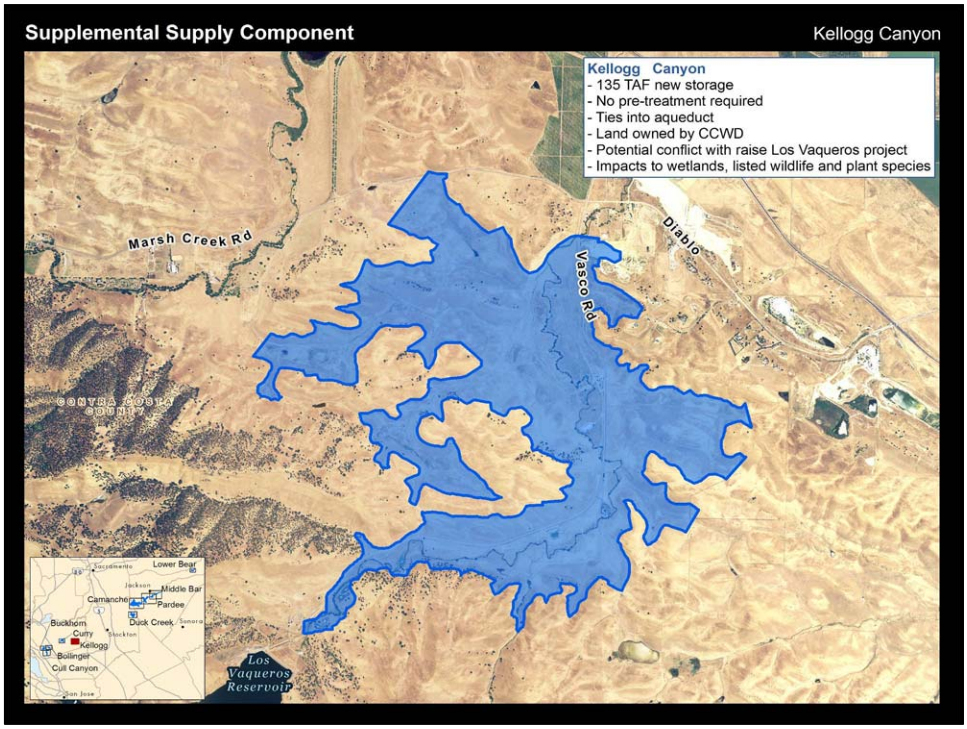

Supplemental Supply Component
Cull Canyon
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Cull Canyon
Cull Canyon
- 100 TAF new storage
- Potential dam seepage and stability issues
- Wetland impacts likely
- Residential, commercial, and recreation uses
- Treatment facilities needed
Upper San Leandro Reservoir
ALAMEDA COUNTY
Redwood Rd
Miller Rd
Crow Canyon Rd
Norris Canyon Rd
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Curry Canyon
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Curry Canyon
Curry Canyon
- 200 TAF new storage
- Residential area and portion of Mt. Diablo State Park
- Potential geologic/geotechnical issues
CONTRA COSTA COUNTY
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Kellogg Canyon
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon



EBMUD Water Supply Management Program 2040

Low-Energy Application Desalination (C&H)

- Produce 1.5 MGD for use in plant
- Potable water offset
- Energy for desalination plant from recovered steam
- Within existing footprint
- Intake/discharge issues

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Water Supply Management Program 2040

Off-shore Desalination

- Desalination facility on ship provides mobility & flexibility
- Tie-ins to conveyance systems needed
- Unproven technology

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Water Supply Management Program 2040

Regional Desalination

- 4 partner agencies: EBMUD, SFPUC, CCWD, SCVWD
- 22 TAF per year EBMUD yield (dry years)
- Provides diversity of water source, flexibility
- Brine discharge
- Impingement & entrainment
- High energy consumption

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EBMUD Water Supply Management Program 2040

Water Transfers

- Potential Water Transfer Partners

1.	**Contra Costa Water District**	**9.**	**Glen-Colusa Irrigation District***
2.	Santa Clara Valley Water District	**10.**	**Plumas County***
3.	San Francisco PUC	**11.**	**City of Folsom***
4.	Alameda County Water Agency	12.	Placer County
5.	Zone 7 Water Agency	13.	Butte County
6.	**City of Lodi***	14.	Yuba County
7.	Amador Water Agency	15.	Western Canal Water District
8.	Woodbridge Irrigation District	**16.**	**Individual Agricultural Users***

* In active discussions
(short, long, or permanent water transfers)

- An indication as to Level of Transfer Activity in 2006

CVP Sac River Division Transfers: 36 short-term/ 2 long-term/ 70,000AF
CVP Delta division Transfers: 26 short-term/ no long-term/ 98,000AF

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EBMUD Water Supply Management Program 2040

Water Transfers

- Northern California Transfers through Freeport
  - Additional treatment required for all transfers through Freeport
  - 170 TAF available capacity in 3-year drought
- Transfer market
  - Impacted by dry conditions
  - "Wanger" decision limits north to south transfers through Delta

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Water Supply Management Program 2040

Supplemental Supply

Statewide
- Sites Reservoir
- Temperance Flat Reservoir
- Expanded Los Vaqueros Reservoir
- Semitropic Groundwater Bank

Central Valley
- Bixler/Delta Diversion
- Duck Creek
- Sacramento Basin Groundwater Banking/Exchange
- San Joaquin Basin Groundwater Banking/Exchange

Local (East Bay)
- Bayside GW – Phase 2
- Bollinger Canyon
- Buckhorn Canyon
- Cull Canyon
- Curry Canyon
- Fog Capture
- Kellogg Canyon
- Low Energy Application for Desalination (LEAD) at C&H Sugar
- Off-Shore Desalination
- Regional Desalination
- Water Bags

Upcountry
- Camanche
- Inter-Regional Conjunctive Use Project
- Lower Bear
- Middle Bar
- Pardee

← **Water Transfers** (short or long-term) →

Water Supply Management Program 2040

Next Steps: Overall

- Complete compilation of cost data for all project components - December
- Apply screening criteria to all project components – December & January
- Rank & organize project components into Most to Least Promising – December & January
- Present screened & evaluated project components at February 2008 Board Workshop
- Begin compiling project components into Portfolios – January & February 2008

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EBMUD Water Supply Management Program 2040

Board of Directors' Workshop #6

February 13, 2008

1

EBMUD Water Supply Management Program 2040

Agenda

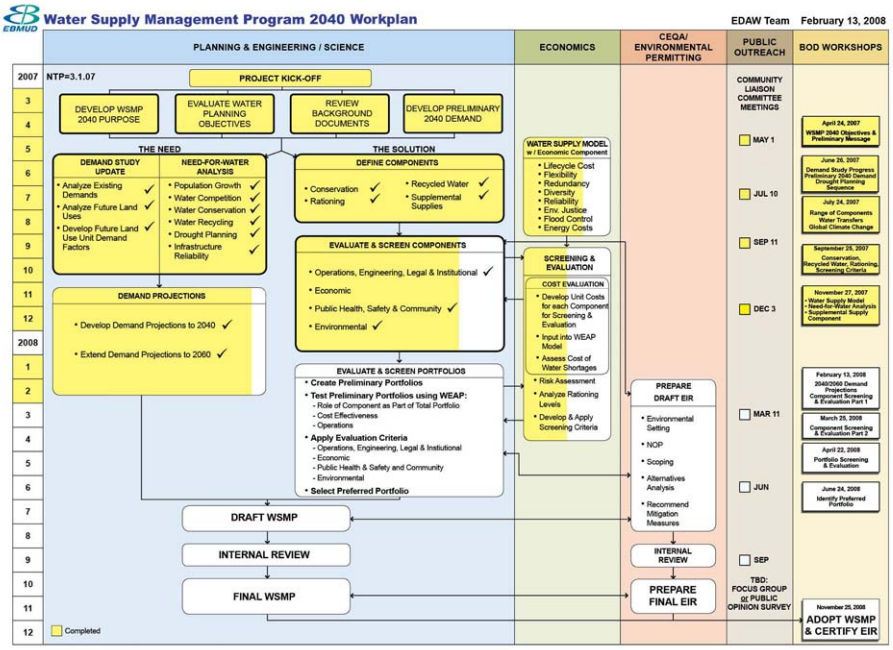
A. **Updates** — 45 min
   1. Action Items from BOD Workshop #5
   2. Water Transfers
   3. Final Demand Projection
   4. Need-for-Water calculation

B. Component Screening & Evaluation: **Supplemental Supply** — 30 min

C. Component Screening & Evaluation: **Recycled & Raw Water** — 30 min

D. Component Screening & Evaluation: **Conservation** — 30 min

2



Water Supply Management Program 2040

Workshops

Board Workshop #6: February 13, 2008

1. Updates: BOD#5 Action Items, Water Transfers, Final Demand Estimate, Need-for-Water
2. Component Screening & Evaluation, Part 1

Board Workshop #7: March 25, 2008

1. Component Screening & Evaluation, Part 2 (including completed unit costs)
2. Identify Portfolio themes to be tested

Board Workshop #8: April 22, 2008

- Portfolio Screening & Evaluation

Board Workshop #9: June 24, 2008

- Identify Preferred Portfolio

EBMUD Water Supply Management Program 2040

Updates

5

EBMUD Water Supply Management Program 2040

BOD #5 Follow-up

- Assess how private wells fit into water supplies
- Consider impacts on demographic sub-groups within the broader residential & commercial/industrial framework
- Consider Native American site impacts in supplemental supply alternatives
- Determine economic impact of rationing

6

EBMUD Water Supply Management Program 2040

Northern California Water Transfers

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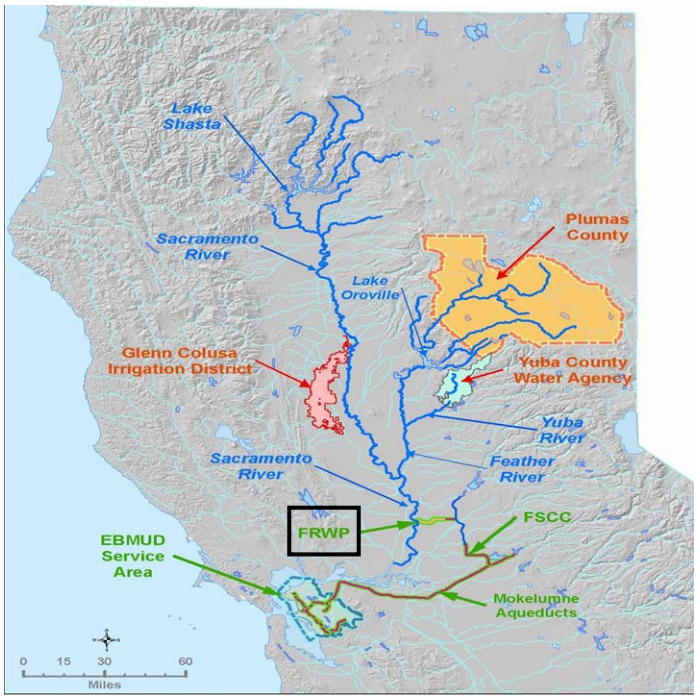

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Water Supply Management Program 2040

Glenn Colusa Irrigation District

Long-Term Dry-Year Transfers

- GCID water rights: 725 TAF Base (Apr-Oct), 105 TAF CVP (July/Aug), 180 TAF (Nov-Mar) rice decomposition
- Completed transfers 5 of last 10 years
- Exploring an arrangement to take water in a few dry years over 30 to 40 year period
- 3 points of evaluation:
  - Transfer frequency/EBMUD need
  - Call period timing (December vs. March) and price
  - Transfer volume and timing flexibility

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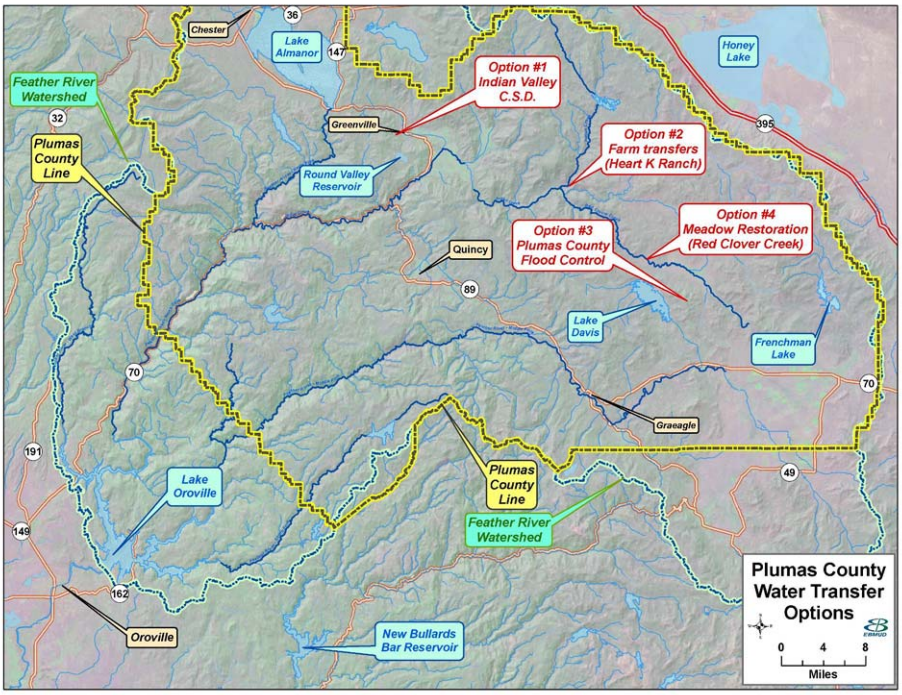
Water Supply Management Program 2040

Yuba County Water Transfers

- Yuba River flows governed by recent Yuba Accord
  - Determines fishery flows in river
  - Allows for transfers
- State Contractors have first refusal for transfers
- Exploring second priority for EBMUD with Freeport diversion
- Met February 6

10



EBMUD Water Supply Management Program 2040

Plumas County

Four Options:

1. Indian Valley Community Service District
   - Delivery of 1 TAF/yr from Round Valley Reservoir
   - Key Issues:
     - Local public acceptance
     - Limited partner resources
2. Farm Transfers
   - Similar to Ag-based water transfers
   - Heart K Ranch identified as "test" case (~2.9 TAF/yr available)
3. Plumas County Flood Control
   - Unallocated flows (1 to 1.5 TAF/yr) available yearly from Lake Davis and Frenchman Lake
4. Alpine meadow restoration and groundwater storage

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EBMUD Water Supply Management Program 2040

Plumas County Meadow Restoration

- "Plug and Pond" streambed to restore natural floodplains
  - Excess water available for transfer
  - Benefits: erosion control, riparian habitat, flood control, hydro power generation, water quality, cattle grazing, and carbon footprint.
- Potential hundreds of thousands of acre-feet of groundwater storage
- Research needed on quantity and water rights

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Red Clover Creek Meadow (Plug/Pond)

Red Clover Creek Meadow Restoration

Water Supply Management Program 2040

Water Transfers Next Steps

- GCID
  - Evaluating range of water transfer frequency, optimal call period and transfer volume/timing.
- Yuba County
  - February 6 meeting follow-up
- Plumas County
  - IVCSD to gauge community interest
  - EBMUD to furnish list of questions on project feasibility
    - Lake Oroville pass - through
    - Quantities available and timing
    - Community acceptance
    - Specific sites

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Water Supply Management Program 2040

Demand Study

Final Demand Projections

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Water Supply Management Program 2040

Final Demand Projections

- Baseline Assumptions & Results
- Projections by Region
- Next Steps

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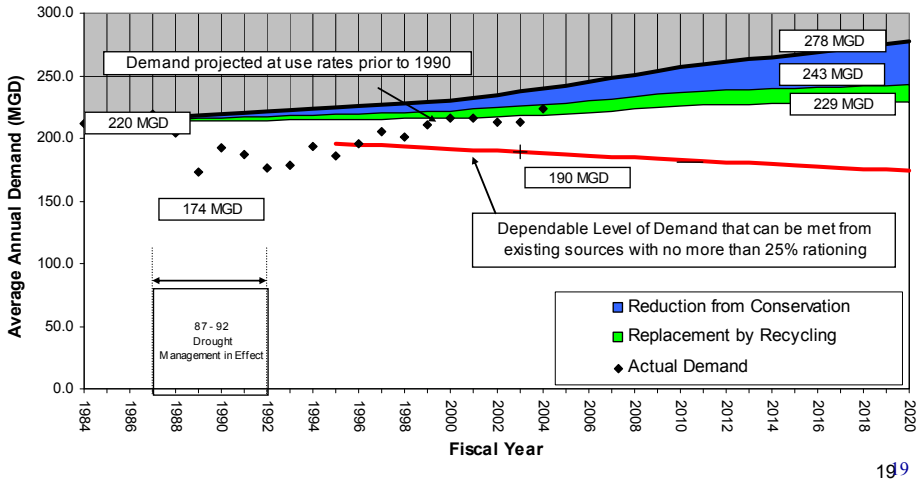
Water Supply Management Program 2040

Demand Forecast to year 2020



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Water Supply Management Program 2040

Demand Projections: Final Results

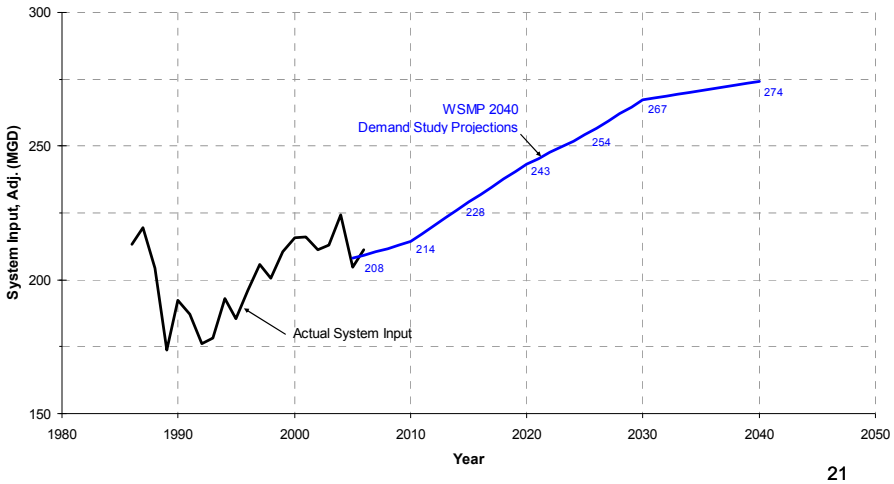
	2005	2010	2015	2020	2025	2030	2040
System Input (normalized - unadjusted)	232	246	261	275	286	299	306
Baseline Conservation*	-18.0	-22.5	-22.5	-22.5	-22.5	-22.5	-22.5
Baseline Recycled Water*	-6.0	-9.3	-9.3	-9.3	-9.3	-9.3	-9.3
System Input (adjusted)	**208**	214	229	243	254	267	274

*WSMP 2040 assumptions: conservation and recycled water
Preliminary 2040 Demands: 258 mgd

20

Water Supply Management Program 2040

Demand Projections: Final Results



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Water Supply Management Program 2040

Increasing Densities

22

Water Supply Management Program 2040

Central Area - Aggressive Redevelopment

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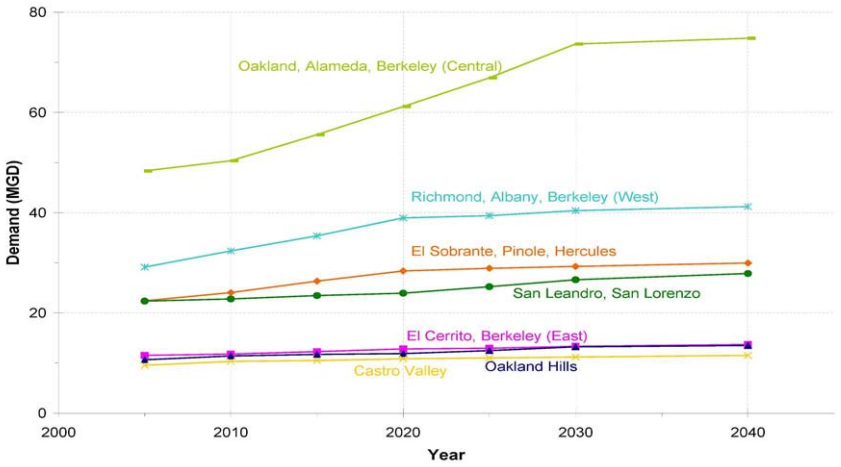
Water Supply Management Program 2040

Demand Projections: Regions West of Hills



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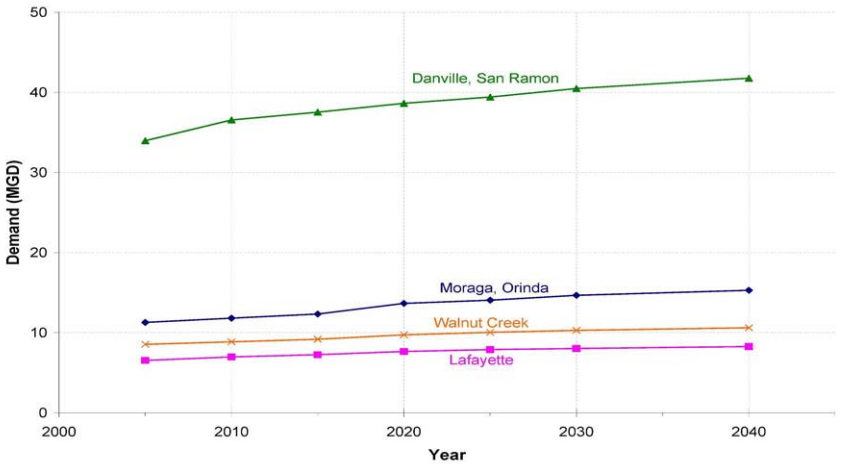
EBMUD Water Supply Management Program 2040

Demand Projections: Regions East of Hills



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EBMUD Water Supply Management Program 2040

Need for Supplemental Water

Results with Final Demand Projection

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Water Supply Management Program 2040

Assumptions

- 2040 demand estimate = 274 MGD
- Demand estimate assumes:
  - Recycled water projects through 2010 = 9.3 MGD
  - Conservation programs through 2008 = 22.5 MGD

= 306 MGD

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Water Supply Management Program 2040

Need for Supplemental Water Supplies in 2040 During DPS

Uses Final Demand Projection of 274 MGD

Maximum rationing	Gross Annual Average Customer Demand (MGD)	Average Annual Need for Water (MGD)	Need for Water over 3 years (TAF)[b]
25%	306[a]	57	194
15%	306	77	259
10%	306	87	294
0%	306	107	359

a. *Includes 274 MGD + 31 MGD for ongoing recycling and conservation*

b. *Estimated values*

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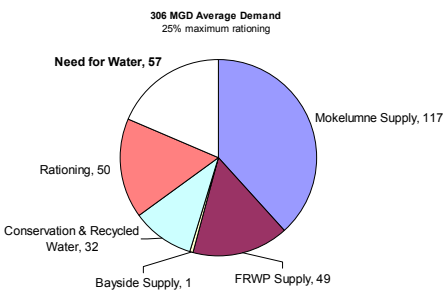
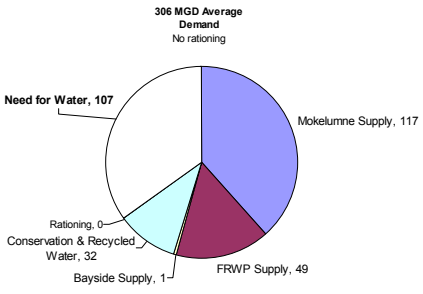
Water Supply Management Program 2040

2040 Water Supply
Rationing at 0% & 25%

2040 Water Supply
Average during the 3-year Drought Planning Sequence



2040 Water Supply
Average during the 3-year Drought Planning Sequence



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Water Supply Management Program 2040

Component Screening & Evaluation
Part 1

30

Water Supply Management Program 2040

Water Supply Portfolios

Building a Portfolio from Project Components

Components			
Conservation	Rationing	Recycled Water	Supp. Supply
A	0%	1	1
B	10%	2	2
C	15%	3	3
D	25%	4	4
E		5	5
		6	6
		22	25

Example Portfolio 1

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Water Supply Management Program 2040

Supplemental Supply Component

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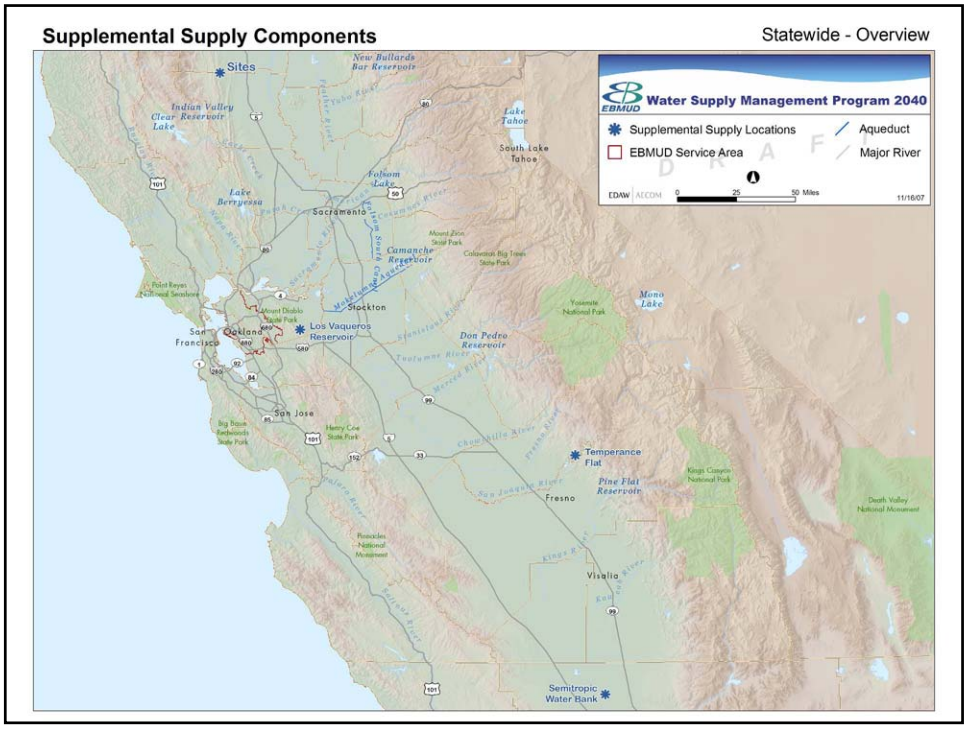
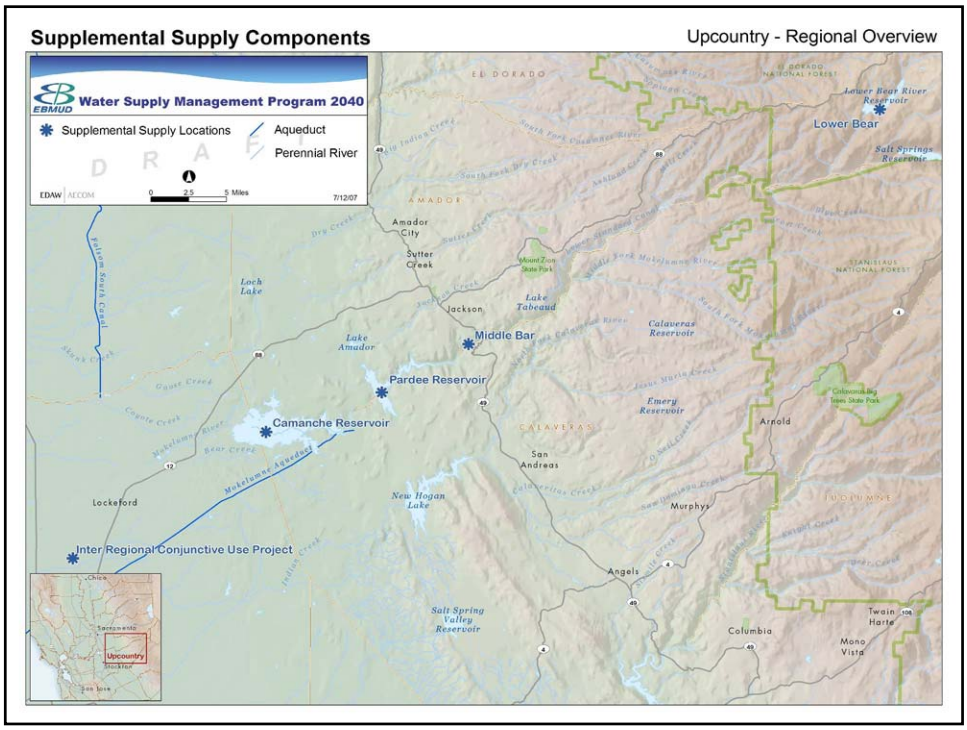
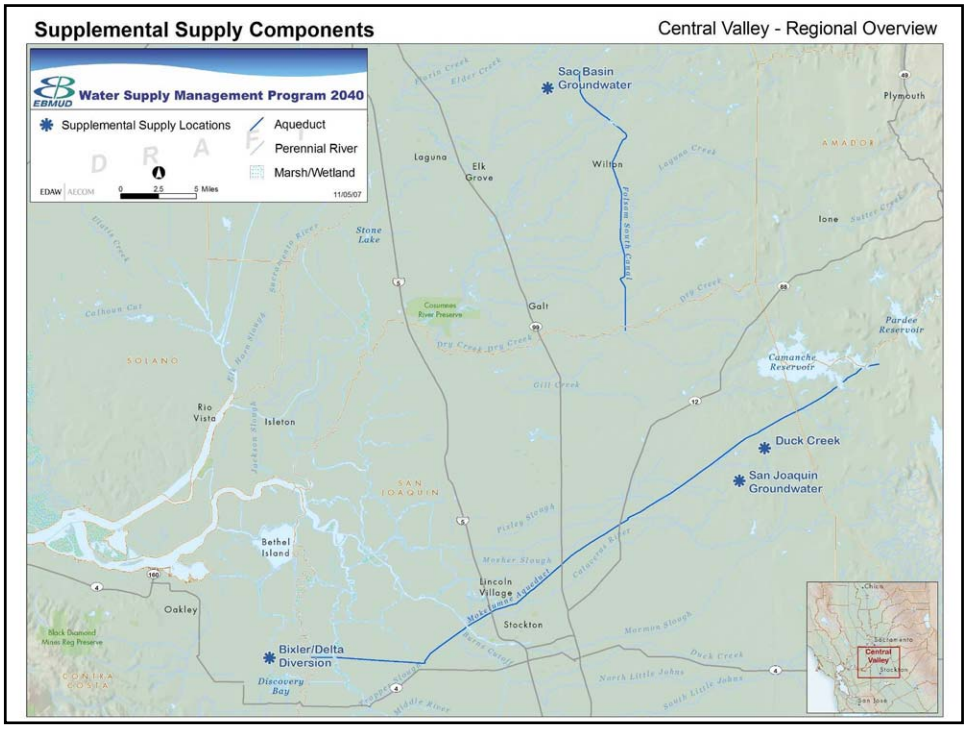
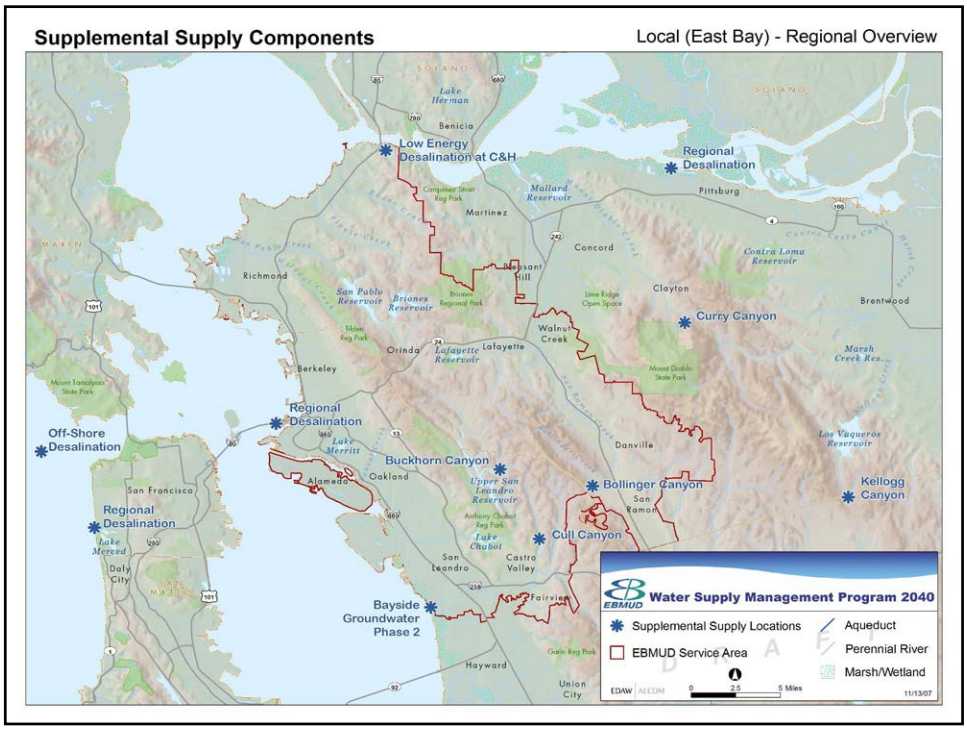

Supplemental Supply Components
Statewide - Overview
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
EBMUD Service Area
Major River
DRAFT
Sites
Los Vaqueros Reservoir
Temperance Flat
Semitropic Water Bank
Sacramento
Stockton
Oakland
San Jose
Fresno
Visalia
Lake Tahoe
Mono Lake


Supplemental Supply Components
Upcountry - Regional Overview
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
DRAFT
Lower Bear
Middle Bar
Pardee Reservoir
Camanche Reservoir
Inter Regional Conjunctive Use Project
Amador City
Sutter Creek
Jackson
San Andreas
Arnold
Murphys
Angels
Columbia
Twain Harte
Mono Vista
Lockeford


Supplemental Supply Components
Central Valley - Regional Overview
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
Marsh/Wetland
Sac Basin Groundwater
Duck Creek
San Joaquin Groundwater
Bixler/Delta Diversion
Rio Vista
Isleton
Bethel Island
Oakley
Stockton
Lincoln Village
Galt
Elk Grove
Laguna
Wilton
Ione
Plymouth
Pardee Reservoir
Camanche Reservoir
SOLANO
AMADOR
SAN JOAQUIN
CONTRA COSTA

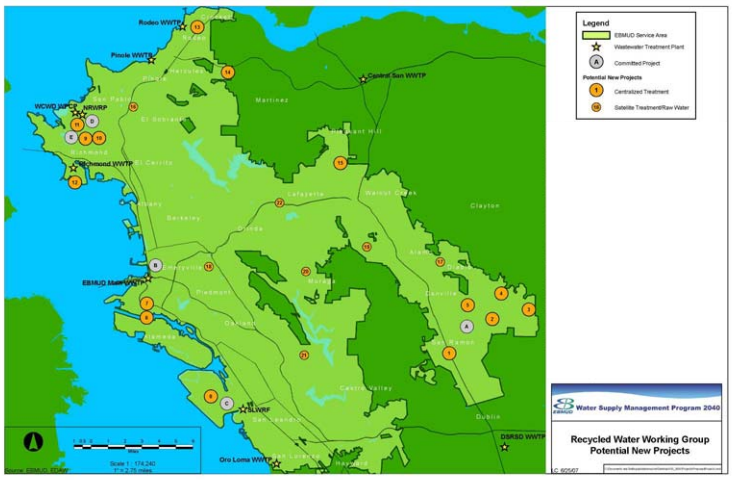

Supplemental Supply Components
Local (East Bay) - Regional Overview
Water Supply Management Program 2040
Supplemental Supply Locations
EBMUD Service Area
Aqueduct
Perennial River
Marsh/Wetland
Low Energy Desalination at C&H
Regional Desalination
Off-Shore Desalination
Regional Desalination
Buckhorn Canyon
Bollinger Canyon
Cull Canyon
Curry Canyon
Kellogg Canyon
Bayside Groundwater Phase 2
Benicia
Martinez
Pittsburg
Concord
Richmond
Berkeley
Orinda
Lafayette
Walnut Creek
Clayton
Brentwood
Danville
San Ramon
Alameda
Oakland
San Francisco
Hayward
Union City
Fairview
San Leandro
Castro Valley
Dublin
Pleasanton
SOLANO
MARIN

Water Supply Management Program 2040

Recycled Water Component

Water Supply Management Program 2040

Potential Projects within EBMUD Service Area



Water Supply Management Program 2040

Conservation Component

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Water Supply Management Program 2040

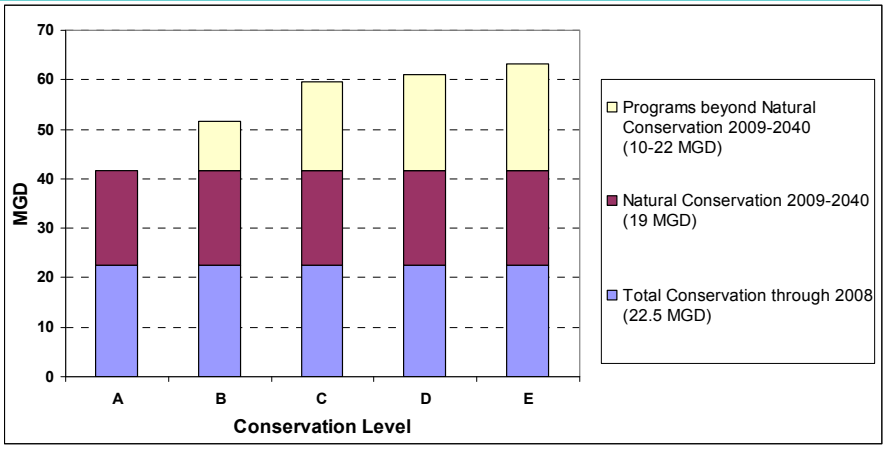
Conservation Approach
2009 & beyond

- Analyzed 53 individual conservation measures beyond plumbing codes
- Range of analysis: from natural savings to maximum voluntary conservation potential
- Assess technology, behavior and leak repair
- Assess implementation barriers (e.g. customer acceptance, market saturation, cost)
- Range of market saturation by measure: <1% to 95%

40

Water Supply Management Program 2040

Conservation Ranges



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Water Supply Management Program 2040

Conservation Level A - E Comparison

Level	Description	# of Measures[1]	2040 Water Savings (MGD)	% Market Saturation	Average Incremental Dry Year Unit Cost ($/AF) [2]
A	Natural savings	11	19	10-50%	NA
B	Natural savings + 10	39	29	10-65%	$500
C	Current program equivalent	51	37	15-75%	$3,600
D	Current program equivalent + 2	53	39	20-80%	$6,300
E	Maximum voluntary program	58	41	25-95%	$11,300

[1] Estimated range of multiple measures/products across all customer sectors.
[2] Preliminary number based on need for water in 3 of 10 years.

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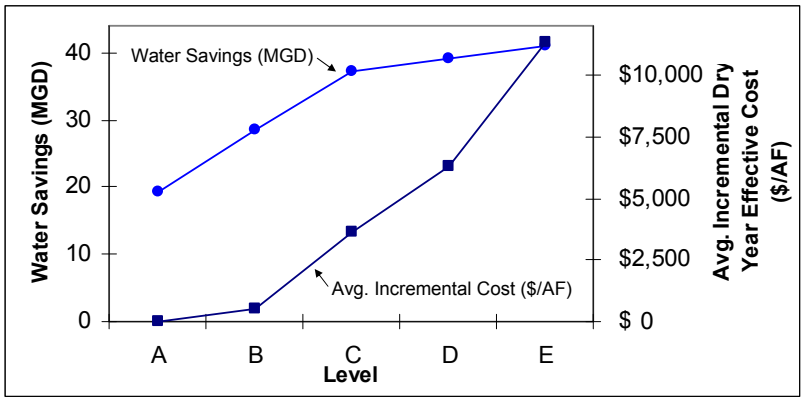
Water Supply Management Program 2040

Conservation Level A - E Comparison
Preliminary Cost Evaluation



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Water Supply Management Program 2040

Level A: Natural Savings

11 Conservation Measures[1]	2040 Water Savings (MGD)	$/AF[2]
Toilet standards	11.0	NA
Urinal standards	0.54	NA
Showerhead standards	0.56	NA
Clotheswasher standards	7.1	NA
TOTAL	**19.2**	NA

[1] Estimated range of multiple measures/products across all customer sectors.
[2] Plumbing code requirement, therefore cost is not applicable.

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Water Supply Management Program 2040

Level B: Natural Savings + 10
Level A + 28 New Measures

- MF surveys
- MF surveys with automated metering
- Smart irrigation controller rebates
- Commercial surveys with automated metering
- Irrigation Water Budgets
- Irrigation water budgets w/automated metering
- Retrofit on resale toilet ordinance (SF) I*
- Retrofit on resale toilet ordinance (MF) I*
- MF submeter incentive
- Res. clotheswasher rebates I*
- Comm. clotheswasher rebates I & II*
- Dental Vacuum Pumps
- Water Brooms
- Artificial turf sports fields
- Public Education
- New development requirements:
  - Automated metering
  - High efficiency toilets
  - High efficiency washers
  - High efficiency faucets, showerheads
  - MF submetering
  - Smart irrigation controllers
  - Hot water on demand
  - Landscape and irrigation standards
  - New commercial urinals
  - Commercial plan review
  - High efficiency dishwashers
  - Plan review for new CII

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**** Multiple levels of market penetration***

Water Supply Management Program 2040

Level B: Natural Savings + 10

39 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Incremental Dry-Year Unit Cost ($/AF) [2]
Level A (Natural Savings)	19	
Level B	10	
TOTAL	**29**	**$500**

[1] Estimated range of multiple measures/products across all customer sectors.
[2] Preliminary number based on need for water in 3 of 10 years.

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Water Supply Management Program 2040

Level C: Current Program Equivalent

Level B + 12 New Measures

- SF Surveys
- SF Surveys w/automated metering
- CII Surveys
- Commercial/Institutional/Industrial equipment rebates
- Condo Surveys
- Condo Surveys w/automated metering
- High efficiency toilet rebates I & II*
- Irrigation Water Surveys
- SF garbage disposal incentive
- Leak Detection & Repair Reduction II*
- Artificial Turf SF Residential

**** Multiple levels of Market Penetration***

51 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Incremental Dry-Year Unit Cost ($/AF) [2]
Level B (39 measures)	29	
Level C	8	
TOTAL	37	$3,600

[1] *Estimated range of multiple measures/products across all customer sectors.*
[2] *Preliminary number based on need for water in 3 of 10 years.*

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Water Supply Management Program 2040

Level D: Current Program + 2

Level C + 2 New Measures

- Required Plumbing for Future Graywater Use in SF Residential
- Financial Incentives/Rebates for Irrigation Upgrades

53 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Incremental Dry-Year Unit Cost ($/AF) [2]
Level C (51 measures)	37	
Level D	2	
TOTAL	39	$6,300

[1] *Estimated range of multiple measures/products across all customer sectors.*
[2] *Preliminary number based on need for water in 3 of 10 years.*

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Water Supply Management Program 2040

Level E: Maximum Voluntary Program

Level D + 5 New Measures

- Graywater retrofit incentive (SF)
- Graywater incentive for new construction (SF)
- High Efficiency Urinal Rebate (<0.25 gal)
- Financial Incentives for Irrigation Upgrades (Extensive)
- Cisterns

58 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Marginal Unit Cost ($/AF) [2]
Level D (53 measures)	39	
Level E	2	
TOTAL	**41**	**$11,300**

[1] *Estimated range of multiple measures/products across all customer sectors.*
[2] *Preliminary number based on need for water in 3 of 10 years.*

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Water Supply Management Program 2040

Board of Directors' Workshop #7

March 25, 2008

1

Water Supply Management Program 2040

Agenda

1. Project Update — 90 min
   - Schedule
   - Summary of Previous Workshops
   - Action Items from February Workshop
   - CLC Meeting Summaries: 3/6 (Catch-Up) & 3/11
   - 6-month Storage Requirement
   - Climate Change Sensitivity Analysis Results
   - Rationing Component
   - Cost of Water Shortage
2. Component Screening Part 2, with Component Costs — 30 min
3. Portfolio Building — 60 min

2

EBMUD Water Supply Management Program 2040

Project Update

3

EBMUD Water Supply Management Program 2040 Workplan — EDAW Team — March 25, 2008

	PLANNING & ENGINEERING / SCIENCE	ECONOMICS	CEQA/ ENVIRONMENTAL PERMITTING	PUBLIC OUTREACH	BOD WORKSHOPS
2007	NTP=3.1.07			COMMUNITY LIAISON COMMITTEE MEETINGS	
3	PROJECT KICK-OFF				
4	DEVELOP WSMP 2040 PURPOSE; EVALUATE WATER PLANNING OBJECTIVES; REVIEW BACKGROUND DOCUMENTS; DEVELOP PRELIMINARY 2040 DEMAND				
5	THE NEED: DEMAND STUDY UPDATE (Analyze Existing Demands ✓; Analyze Future Land Uses; Develop Future Land Use Unit Demand Factors ✓); NEED-FOR-WATER ANALYSIS (Population Growth ✓; Water Competition ✓; Water Conservation ✓; Water Recycling ✓; Drought Planning ✓; Infrastructure Reliability ✓) — THE SOLUTION: DEFINE COMPONENTS (Conservation ✓; Rationing ✓; Recycled Water ✓; Supplemental Supplies ✓)	WATER SUPPLY MODEL w/ Economic Component: Lifecycle Cost; Flexibility; Redundancy; Diversity; Reliability; Env. Justice; Flood Control; Energy Costs			
6				MAY 1	1 April 24, 2007 WSMP 2040 Objectives & Preliminary Message
7					2 June 26, 2007 Demand Study Progress Preliminary 2040 Demand Dropping Into Place
8				JUL 10	3 July 24, 2007 Range of Components Water Transfers Global Climate Change
9				SEP 11	4 September 25, 2007 Conservation, Recycled Water, Rationing, Screening Criteria
10					
11	DEMAND PROJECTIONS: Develop Demand Projections to 2040 ✓; Extend Demand Projections to 2060 ✓ — EVALUATE & SCREEN COMPONENTS: Operations, Engineering, Legal & Institutional ✓; Economic ✓; Public Health, Safety & Community ✓; Environmental ✓	SCREENING & EVALUATION; COST EVALUATION: Develop Unit Costs for each Component for Screening & Evaluation; Input into WEAP Model; Assess Cost of Water Shortages			5 November 27, 2007 • Water Supply Model • Need-for-Water Analysis • Supplemental Supply Component
12				DEC 3	
2008					
1					
2	EVALUATE & SCREEN PORTFOLIOS: • Create Preliminary Portfolios • Test Preliminary Portfolios using WEAP: - Role of Component as Part of Total Portfolio - Cost Effectiveness - Operations • Apply Evaluation Criteria - Operations, Engineering, Legal & Institutional - Economic - Public Health & Safety and Community - Environmental • Select Preferred Portfolio	Risk Assessment; Analyze Rationing Levels; Develop & Apply Screening Criteria			6 February 13, 2008 2040/2060 Demand Projections Component Screening & Evaluation Part 1
3			EIR APPROACH & OUTLINE	MAR 11	7 March 25, 2008 Component Screening & Evaluation Part 2
4			• NOP/Scoping • Alternatives Analysis	APR 7	8 April 22, 2008 Portfolio Screening & Evaluation
5				MAY 19	
6			ADMIN EIR PREP: • Environmental Setting • Impacts & Mitigation • Team Review		9 June 24, 2008 Identify Preferred Portfolio + Implementation Strategy
7					
8	DRAFT WSMP				
9				SEP 9	
10	INTERNAL REVIEW				
11			PUBLIC DRAFT EIR		10 November 25, 2008 FINALIZE WSMP
12	FINAL WSMP		PUBLIC COMMENT		
2009					
1					
2			FINAL EIR		
3					11 March 2009 ADOPT WSMP & CERTIFY EIR

Completed

Water Supply Management Program 2040

Summary of Previous Workshops

Board Workshop #1: April 24, 2007
1. Team Organization & Workplan
2. WSMP 2020 Overview
3. 1993 to Present
4. WSMP 2040 Purpose & Planning Objectives
5. Public Outreach Plan

Board Workshop #2: June 26, 2007
1. Demands Study Status Report & Preliminary Demand Estimate
2. Drought Planning Sequence Evaluation
3. Evaluation Criteria - Approach

Board Workshop #3: July 24, 2007
1. Water Transfers
2. Range of Components
3. Global Climate Change - WSMP 2040 Approach

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Water Supply Management Program 2040

Summary of Previous Workshops (continued)

Board Workshop #4: September 25, 2007
1. Evaluation Criteria
2. Conservation Component
3. Rationing Component
4. Recycled Water Component

Board Workshop #5: November 27, 2007
1. Conservation Program - more detail on programs as requested at BOD#4
2. Water Supply Model
3. Need-for-Water Analysis Results
4. Supplemental Supply Component

Board Workshop #6: February 13, 2008
1. Updates: BOD#5 Action Items, Water Transfers, Final Demand Estimate, Need-for-Water
2. Component Screening & Evaluation, Part 1

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Water Supply Management Program 2040

Upcoming Workshops

Board Workshop #7: March 25, 2008

1. Project Update
2. Component Screening Part 2, with Component Costs
3. Portfolio Building

[April 7, 2008 CLC Meeting to follow]

Board Workshop #8: April 22, 2008

- Portfolio Screening & Evaluation

[May 19, 2008 CLC Meeting to follow]

- **Board Workshop #9: June 24, 2008**
- Identify Preferred Portfolio & Implementation Strategy

[CLC Members encouraged to attend]

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Water Supply Management Program 2040

Action Items from February Board Workshop

1. Provide customer types for each recycled water project
2. Detail the impact of rationing on different customer classes
3. Provide a best guess carbon footprint for recycled water projects
4. Confirm upcountry recycled water projects being carried forward & being eliminated from the modeling round
5. Provide more detail on each conservation measure
   - Can Conservation Level D include a graywater incentive
6. Describe which components are being carried forward

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Water Supply Management Program 2040

CLC Meeting Summaries

Catch-Up: 3/6/2008

Meeting #5: 3/11/2008

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Water Supply Management Program 2040

Primary Issues Raised
CLC Catch-Up: March 6, 2008

- How would a new Delta conveyance facility affect EBMUD?
- Comments on water transfers:
  - How will you pursue water transfers to the maximum possible?
  - Consider water transfer possibilities/trades in wet years
- Have you investigated future developments & associated water demand (in the Central Valley) & how that would affect demand?
- We need to plan for more uncertainty. Potential extra water saving possibilities need to be kept.
- Are we being visionary enough?

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Water Supply Management Program 2040

Primary Issues Raised
CLC #5: March 11, 2008

Final Demand Projection
- Consider asking planning department for a high, medium, & low range instead of just one future prediction
- Traffic & community resistance may reduce actual growth from projections
- There will be more people, if not in "resistance" areas, then in others
- It is easier to serve a growing population in denser areas (e.g., West of Hills than East of Hills)
- The Bay Area is going to be forced to densify due to climate change concerns, vehicle miles travelled, etc., in addition to water concerns

Supplemental Supply Components
- Changes in water quality can be costly for end users/businesses that require a certain quality of water
- Some supplemental supply components look marginal for continued inclusion (e.g., LEAD Desal at C&H, Sacramento groundwater banking (low storage))
- Does the carbon footprint account for loss of vegetation due to inundation?

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Water Supply Management Program 2040

Primary Issues Raised
CLC #5: March 11, 2008

Recycled Water
- The driver is the industrial partner who may need to integrate recycling into their operations
- Consider an upcountry recycled water project as a "pilot project"

Conservation
- Concern expressed about placing a disproportionate share of the (economic) burden on new developments
- Provide more information on the cost of conservation per customer

Portfolios
- Will only one portfolio be chosen?
- How many alternatives will be analyzed in the CEQA document?
- Consider location on the San Andreas when reviewing component reliability

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Water Supply Management Program 2040

6-Month Local Storage Criterion

13

Water Supply Management Program 2040

6-Month Local Storage Criterion

- The current local storage meets the 6-month local storage criterion
- Due to increasing demand by year 2040, existing system would provide local storage of 4.5 months
- Interties exist with CCWD & the SFPUC/City of Hayward which can be used to transfer water during emergencies
- WSMP 2040 will not require that each portfolio meets 6-month local storage criteria, but portfolios that reduce local storage deficit will score higher on diversification & infrastructure reliability criteria
- The District should preserve an ability to increase rationing for emergency purposes

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Water Supply Management Program 2040

Evaluation of Climate Change

Approach & Results

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Water Supply Management Program 2040

Approach

1. Identify factors which may influence EBMUD system performance
   - Customer demand
   - Runoff amount
   - Runoff pattern
2. Vary these 3 factors & Test Current EBMUD System Performance
   - Quantify how much EBMUD system affected by each factor?
   - What are critical vulnerabilities?
3. Test 4 to 6 portfolios to identify system vulnerabilities

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Water Supply Management Program 2040

Evaluation Factors

- Change in demands resulting from 2.2°C rise in temperature by 2040 (10 MGD increase)
- Shift in springtime runoff resulting from 2°C, 3°C, & 4°C increase in temperature
- Reduction in precipitation & Mokelumne River runoff by 10% & 20%
- River water temperature also likely to rise (not included in hydrologic analysis)

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Water Supply Management Program 2040

Current System Performance

Factor/Case Examined	Impact on System Storage	Impacts on Rationing	Impacts on Flood Releases
Increased Customer Demand (3.6%)	5% average decrease in effective system storage	▪ Up to 44 AF increase in rationing ▪ No change in rationing frequency	None
Shift in Springtime Runoff	Approx. 5% decrease in effective system storage	▪ Up to 71 AF increase ▪ No change in rationing frequency	▪ Small (1 to 6%) increase in total releases ▪ Decrease (12 to 15%) in spring release
Decrease in Precip & Runoff (10 to 20%)	12 to 24% decrease in effective system storage	▪ Up to 198 AF increase in rationing ▪ Significant increases in rationing frequency	▪ Large (27 to 52%) decrease in total release ▪ Similar decrease in spring release

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Water Supply Management Program 2040

Vulnerabilities

Under climate change, District's current system is most vulnerable to:

- Extended droughts, making impacts of current Drought Planning Sequence more severe
- Decreases in annual runoff volumes

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Water Supply Management Program 2040

Implications of Climate Change on Portfolios & Strategy

- District will need flexible Portfolio/Strategy to implement projects in future when triggered by documented climate change effects
- Additional storage provides additional capacity should timing of spring runoff shift

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Water Supply Management Program 2040

Drought Rationing Component

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Water Supply Management Program 2040

Program Types

Stage	April Projection of Storage on September 30	Reduction Goal	Voluntary/ Mandatory
	500 TAF or more	None	
Moderate	500-450 TAF	0 to 15%	Voluntary
Severe	450-300	15 to 25%	Mandatory
Critical	Less than 300 TAF	25%	Mandatory

TAF – Thousand Acre-Feet

Note: Projected storage includes supplemental supply

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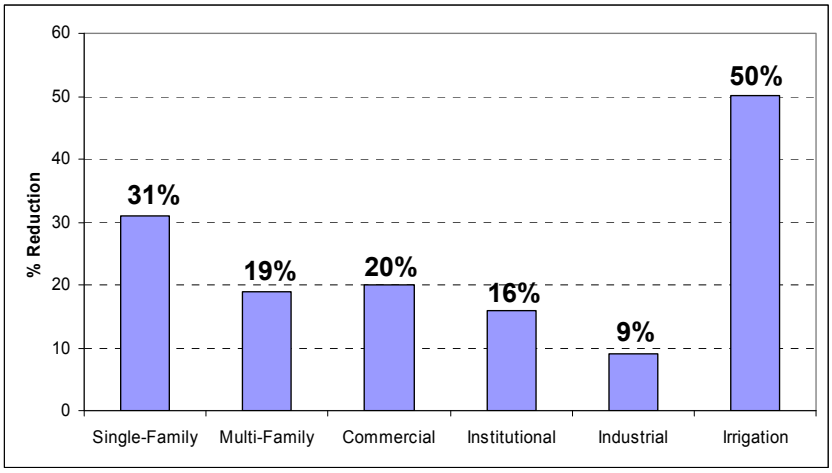
Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 25%



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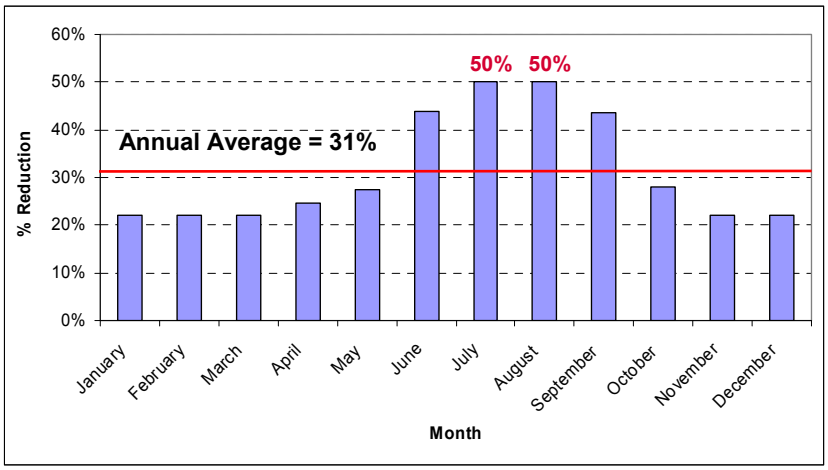
Water Supply Management Program 2040

Single-Family Residential

System-Wide Annual Average = 25%



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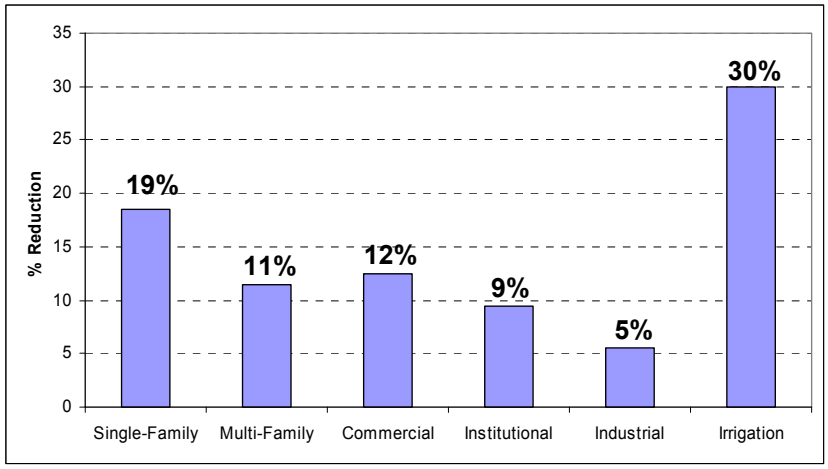
Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 15%



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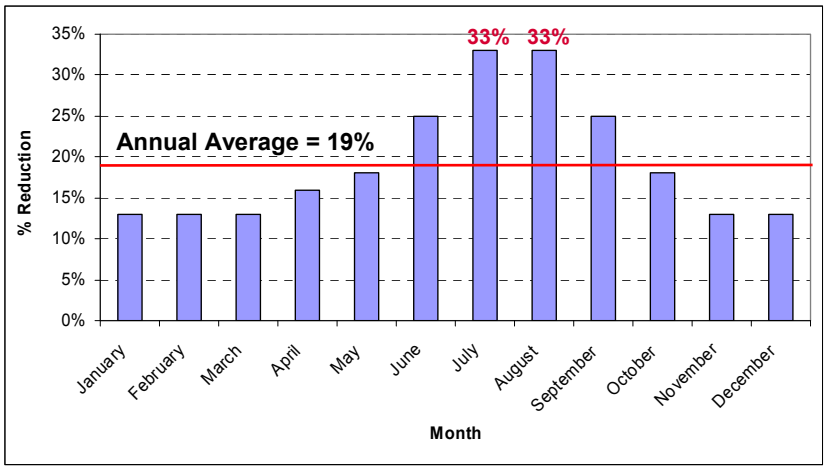
Water Supply Management Program 2040

Single-Family Residential

System-Wide Annual Average = 15%



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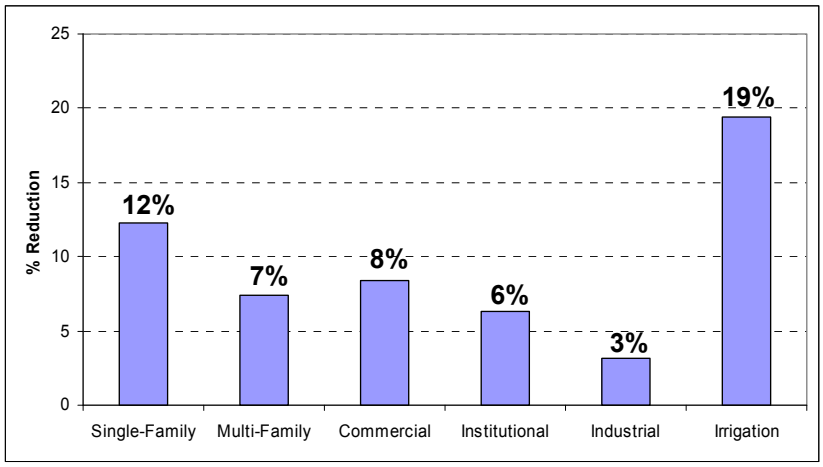
Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 10%



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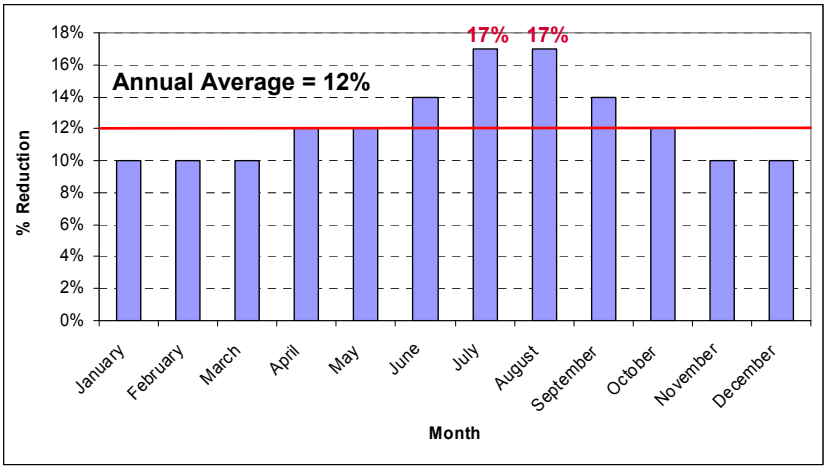
Water Supply Management Program 2040

Single-Family Residential

System-Wide Annual Average = 10%



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Water Supply Management Program 2040

Planned Rationing for Other Agencies

Zone 7 Water Agency	0%
Metropolitan Water District of So. Cal.	0%
Marin Municipal Water District	10% / 25%
San Francisco PUC	10 - 20%
Contra Costa Water District	15%
Alameda County Water District	10%
Santa Clara Valley Water District	No Policy

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Source: Urban Water Management Plan (UWMP) 2005 Documents.

Water Supply Management Program 2040

Cost of Water Shortage

Approach & Preliminary Results

30

Water Supply Management Program 2040

Objectives

1. Inform evaluation & comparison of system-average rationing levels of 10%, 15%, & 25%
2. Determine customer impacts & costs of each rationing level
3. Provide information on the impact of water shortages to business within the service area
4. Allow comparison of costs of water shortages to other studies & water districts

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Water Supply Management Program 2040

Approach

Cost of water shortage to residential & institutional water users:

- Evaluate the maximum amount that customers would be willing to pay to avoid a water shortage
- Incorporates WSMP 2040 Demand projection
- Used by SFPUC, Alameda County Water District, DWR
- Reviewed & endorsed by CLC member, Dr. Hanemann

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Water Supply Management Program 2040

Approach

Impact of water shortages on commercial & industrial water users:

- Use data developed by SFPUC in early 1990s on relationships between output, payroll, & water use
- Regional economic model referenced to estimate service area impacts
- Approach similar to one used by 2007 SFPUC Drought Impact Study

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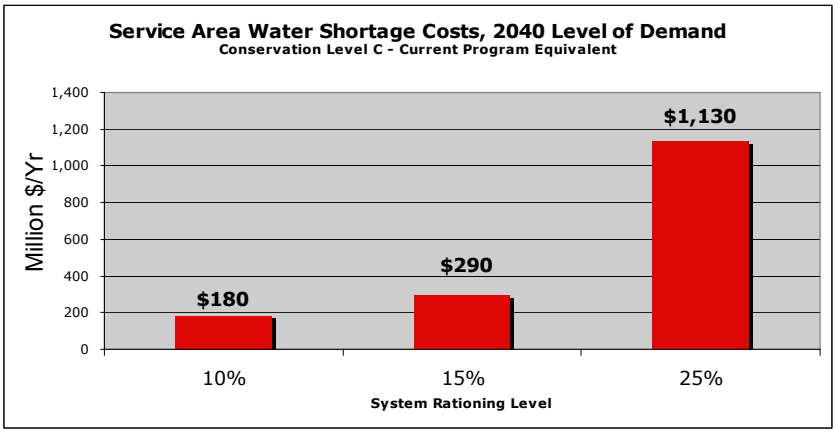
Water Supply Management Program 2040

Results



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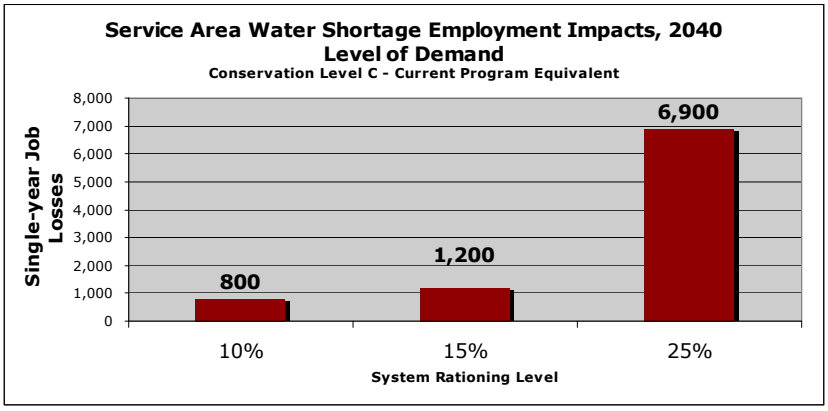
Water Supply Management Program 2040

Results



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Water Supply Management Program 2040

Comparison to Previous Studies

- Residential shortage cost methodology used by
  - RAND, CA Drought Impact Study
  - DWR, Urban Shortage Cost Analysis
  - State of California, Climate Change Impact Studies
  - SFPUC, Regional Drought Impact Study, Catastrophic System Failure Study
- Commercial & Industrial impacts consistent with previous findings
  - CUWA industrial water shortage cost study
  - RAND data on payroll impacts during 1987-91 drought
  - SFPUC, Regional Drought Impact Study

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Water Supply Management Program 2040

Next Steps

- Incorporate Shortage Costs into Portfolio Modeling to generate information on:
  - Total Portfolio Cost Analysis: Water Supply Cost from W-E Model + Shortage Cost
  - Frequency of shortages by portfolio
  - Distribution of shortage costs & impacts by portfolio
  - Probabilities of exceeding shortage cost thresholds by portfolio

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Water Supply Management Program 2040

Component Screening Part 2

38

Water Supply Management Program 2040

Supplemental Supply Projects

Dry Year Unit Cost Estimates

Table 2 - Supplemental Supply Projects Preliminary Dry Year Yield Unit Cost Estimates[a]

Project ID	Project Name	Online Yr	Operation	Dry Year Yield (MGD)	EBMUD Capital Cost (Mil. $)	EBMUD O&M ($/MG)[c]	Total Energy Use KWh/MG[d]	EBMUD Unit Cost ($/AF, Dry Yield)[e]
SUP-25	Northern California Permanent Water Transfer[b]	2010	Permanent	4.5-44.6	$20.0-$200.0	$649	5,217	**$630**
SUP-11	Buckhorn Canyon Reservoir	2015	Storage	42.0	$243.9	$451	3,667	**$710**
SUP-24	Enlarged Pardee Reservoir	2020	Storage	51.2	$340.3	$324	2,021	**$730**
SUP-22	Enlarge Lower Bear Reservoir	2015	Storage	2.2	$12.1	$418	3,038	**$840**
SUP-09	Bayside Phase 2 Groundwater Project	2013	Conjunctive Use	9.0	$35.4	$853	4,719	**$890**
SUP-21	Inter-Regional Conjunctive Use Project (IR-CUP)/San Joaquin (SJ) Groundwater Banking[f]	2014	Conjunctive Use	17.4	$121.1	$1,051	7,919	**$1,200**
SUP-18	Regional Desalination Project	2012	Dry Year	20.0	$72.4	$3,912	11,000	**$1,900**
SUP-07	Groundwater Banking/Exchange (Sacramento Basin)[f]	2014	Conjunctive Use	4.2	$50.1	$1,326	8,895	**$1,900**
SUP-16	LEAD at C&H Sugar	2012	Baseload	1.5	$23.4	$1,945	0	**$2,600**

Notes:
a. Final dry-year yield unit costs will be derived from WEAP modeling. These values will be different than those shown here for comparative purposes.
b. Northern California Permanent Water Transfer costs were based on recent transfers occurring in the State of California. Note that past water prices are no guarantee of how prices may change in the future.
c. O&M costs for adjusted for dry year and recharge year operations depending on the project. O&M costs for idle years are assumed to be 10% of operating year O&M costs.
d. Approximate costs of pumping water through Freeport intake and Mokelumne aqueducts are incorporated into this table for comparative purposes. The expected actual costs will be estimated by the WEAP model.
e. Rounded to nearest $10/AF
f. For groundwater banking projects (IR-CUP/SJ Groundwater Banking, Groundwater Banking/Exchange in Sacramento Basin and the Bayside Phase 2 Groundwater Project), it is estimated that approximately 10% of the water will be lost to migration and delivery system losses. These losses are reflected in this table.

Water Supply Management Program 2040

Recycled Water Projects

Dry Year Unit Cost Estimates

Table 3 – Recycled Water Projects Preliminary Dry Year Yield Unit Cost Estimates

Project ID	Project Name	Online Year	Expected Operation	Dry Year Yield (MGD)	EBMUD Capital Cost (Mil. $)	EBMUD Variable O&M (d) ($/MG)	Variable Energy Use (KWh/MG)	EBMUD Dry Year Unit Cost (e) ($/AF)
REC-01A	ConocoPhillips RWP Phase 2 (a)	2015	Baseload	0.90	$2.9	$-	3,751	**$400**
REC-07	RARE Future Expansion (b)	2015	Baseload	1.00	$-	$1,221	5,606	**$1,300**
REC-06	RARE Phase 2	2012	Baseload	0.50	$-	$1,276	5,606	**$1,400**
REC-10	SRVRWP Phase 2	2010	Baseload	0.75	$5.0	$849	4,265	**$1,600**
REC-12	SRVRWP Phase 4	2016	Baseload	0.37	$2.5	$849	4,265	**$1,600**
REC-01	ConocoPhillips RWP Phase 1	2012	Baseload	2.80	$39.8	$-	3,751	**$1,700**
REC-16	Lake Chabot Raw Water Expansion Project	2010	Baseload	0.36	$4.7	$468	1,051	**$1,800**
REC-11	SRVRWP Phase 3	2013	Baseload	0.58	$5.5	$849	4,265	**$1,900**
REC-04	Franklin Canyon Recycled Water Project	2023	Baseload	0.30	$4.0	$712	4,265	**$2,100**
REC-05	North Richmond Water Reclamation Plant Expansion	2018	Baseload	1.70	$15.4	$1,186	5,607	**$2,200**
REC-03	East Bayshore Phase 2 (c)	2014	Baseload	0.60	$9.4	$987	2,679	**$2,600**
REC-13	SRVRWP Phase 5	2018	Baseload	0.30	$5.4	$849	4,265	**$2,700**
REC-14	SRVRWP Phase 6	2020	Baseload	0.20	$4.0	$849	4,265	**$2,900**
REC-02	East Bayshore Phase 1B	2012	Baseload	1.20	$28.0	$987	2,679	**$3,400**
REC-08	Reliez Valley Recycled Water Project	2015	Baseload	0.19	$3.1	$2,807	4,639	**$4,700**
REC-09	San Leandro Water Reclamation Facility Expansion Project: Phase 3	2015	Baseload	0.56	$16.3	$1,474	2,509	**$5,300**
REC-15	Satellite Recycled Water Treatment Plant Projects (Retrofits)	2014	Baseload	0.72	$42.5	$574	1,724	**$6,100**

Notes:
a. Conditional on implementation of COP Phase 1
b. Conditional on implementation of RARE Phase 2.
c. Conditional on implementation of East Bayshore Phase 1B.
d. Gross variable O&M costs. No credit for avoided costs of water delivery in non-dry years.
e. Rounded to nearest $100.

Water Supply Management Program 2040

Conservation
Dry Year Unit Cost Estimates

Table 4 - Conservation Programs Preliminary Dry Year Yield Unit Cost Estimates

Project ID	Project Name	Online Year	Expected Operation	Total Dry Year Yield [a] (MGD)	EBMUD Capital Cost [b] (Mil. $)	EBMUD Variable O&M [c] ($/MG)	EBMUD Average Incremental Dry Year Cost [d] ($/AF)
CON-02	Natural Savings + 10 (B)	Spans planning period	Baseload	29	$31.4	92	**$800**
CON-03	Current Program Equivalent (C)	Spans planning period	Baseload	37	$225.4	432	**$6,200**
CON-04	Current Program Equivalent + 2 (D)	Spans planning period	Baseload	39	$319.4	474	**$13,400**
CON-05	Maximum Voluntary Program (E)	Spans planning period	Baseload	41	$426.0	693	**$19,700**

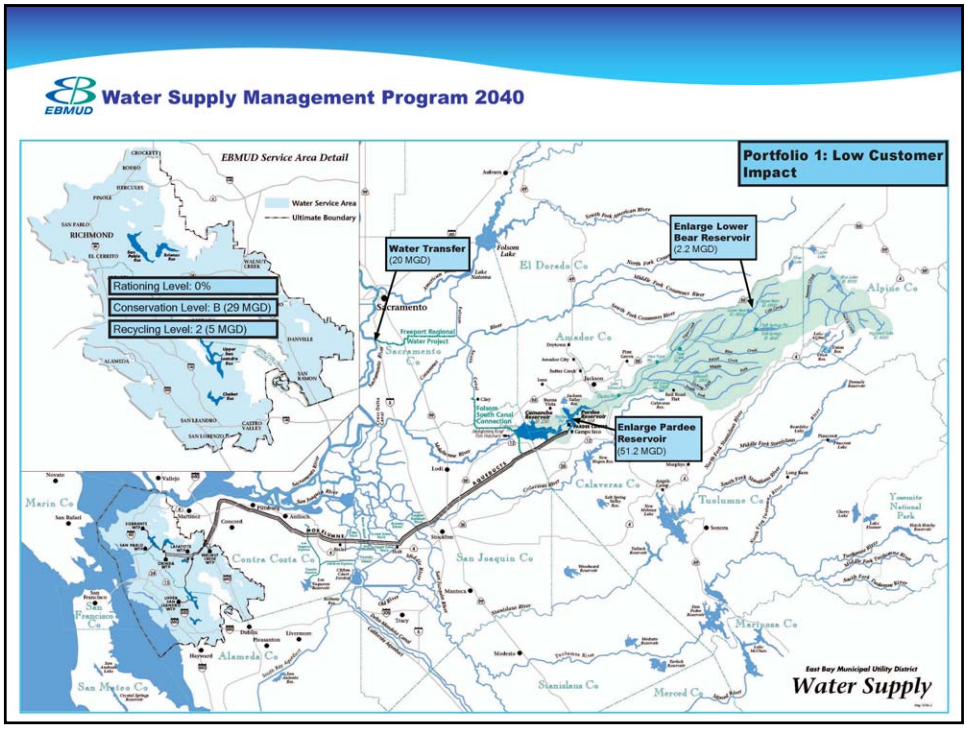
Notes:
a. Total dry-year yield by 2040. Yields ramp up over the planning period. Includes 19.2 MGD yield from plumbing code.
b. 2010 present value capital cost.
c. Gross variable O&M costs. No credit for avoided wastewater treatment costs or avoided costs of water delivery in non-dry years.
d. Rounded to nearest $100.

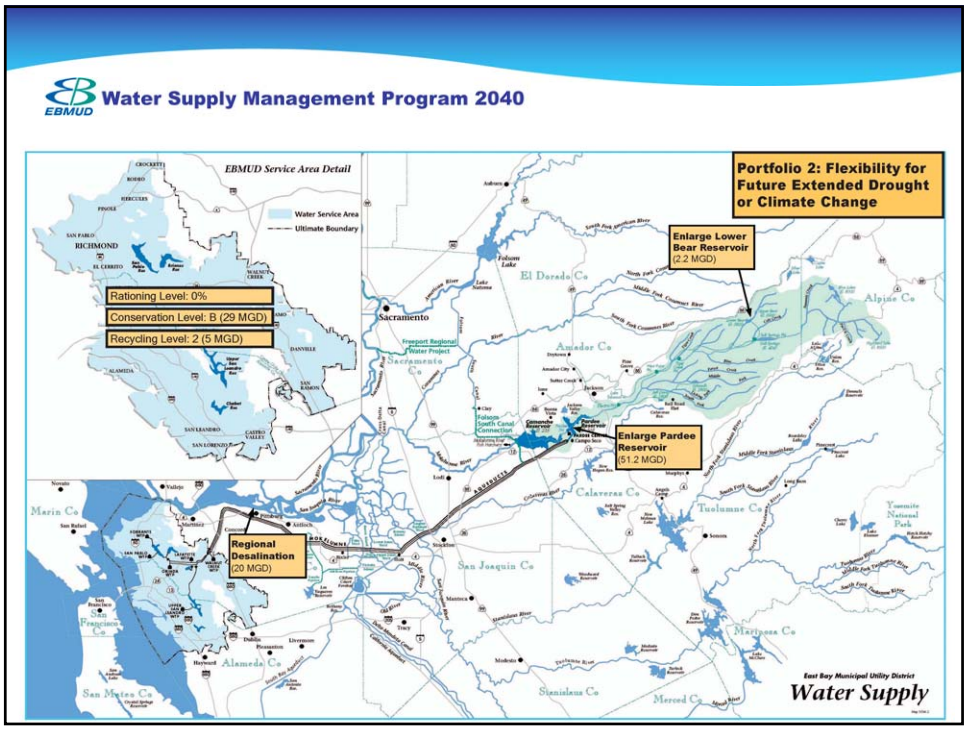
41

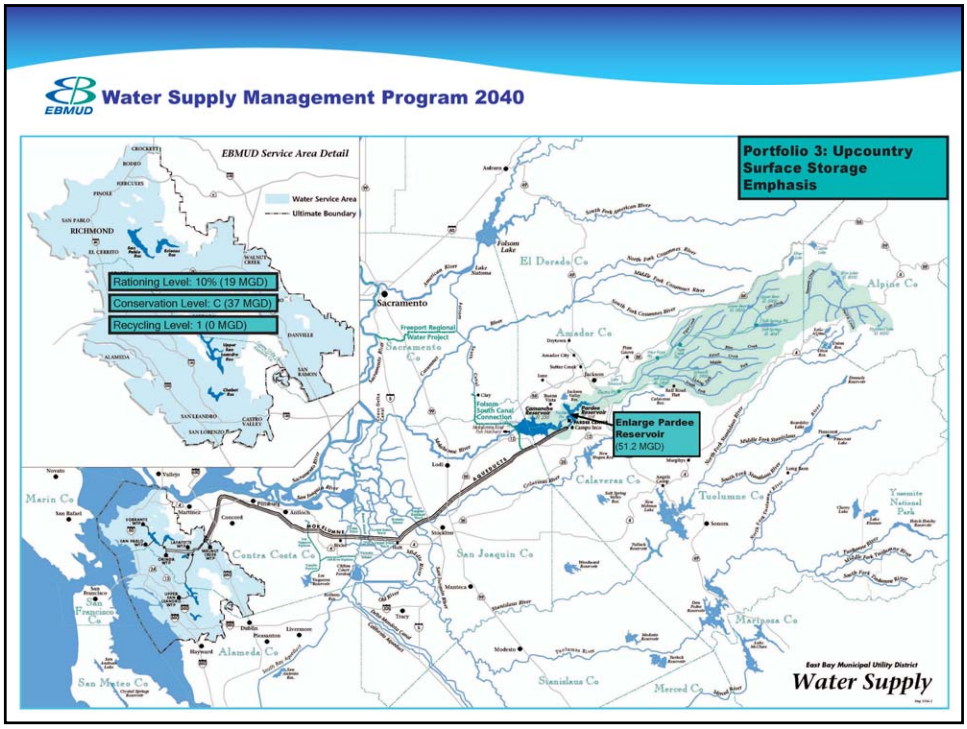
Water Supply Management Program 2040

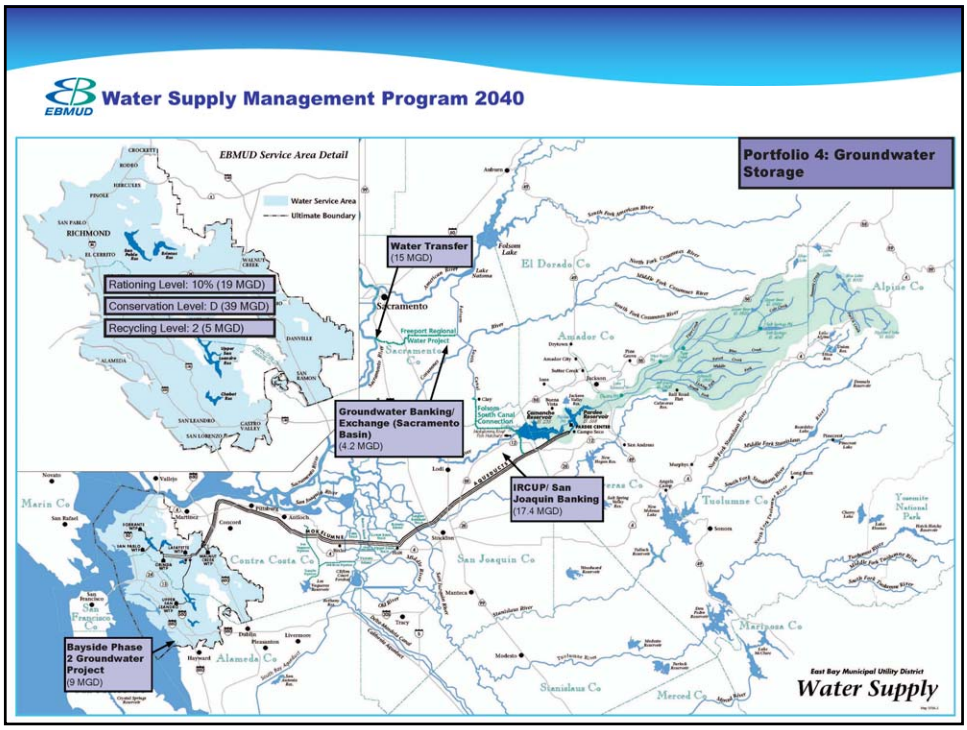
Portfolio Building

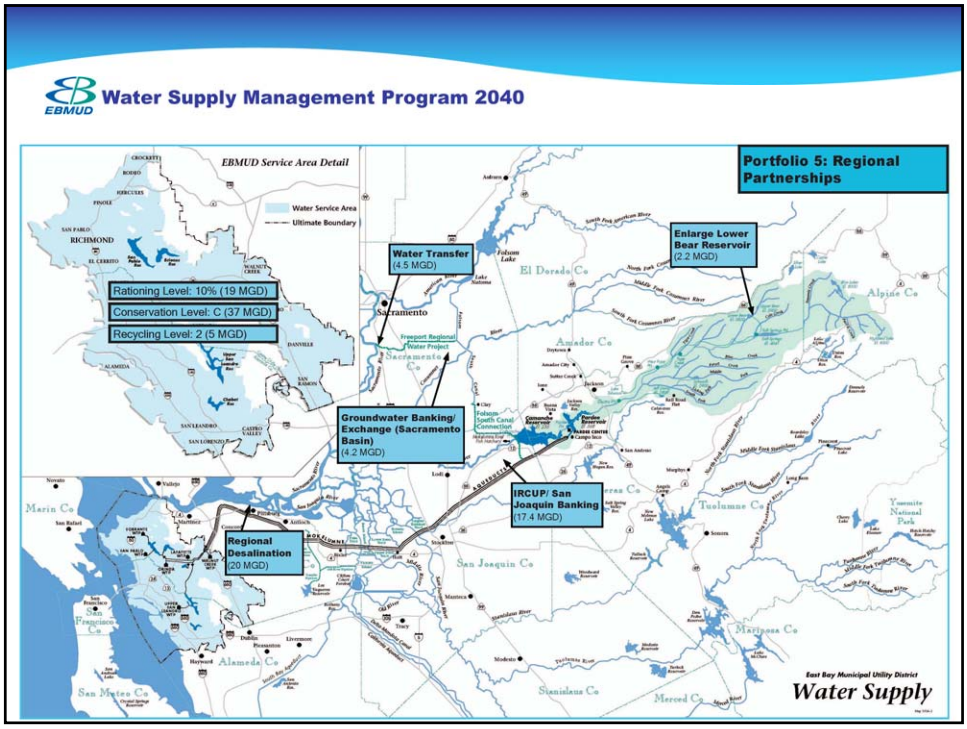
42

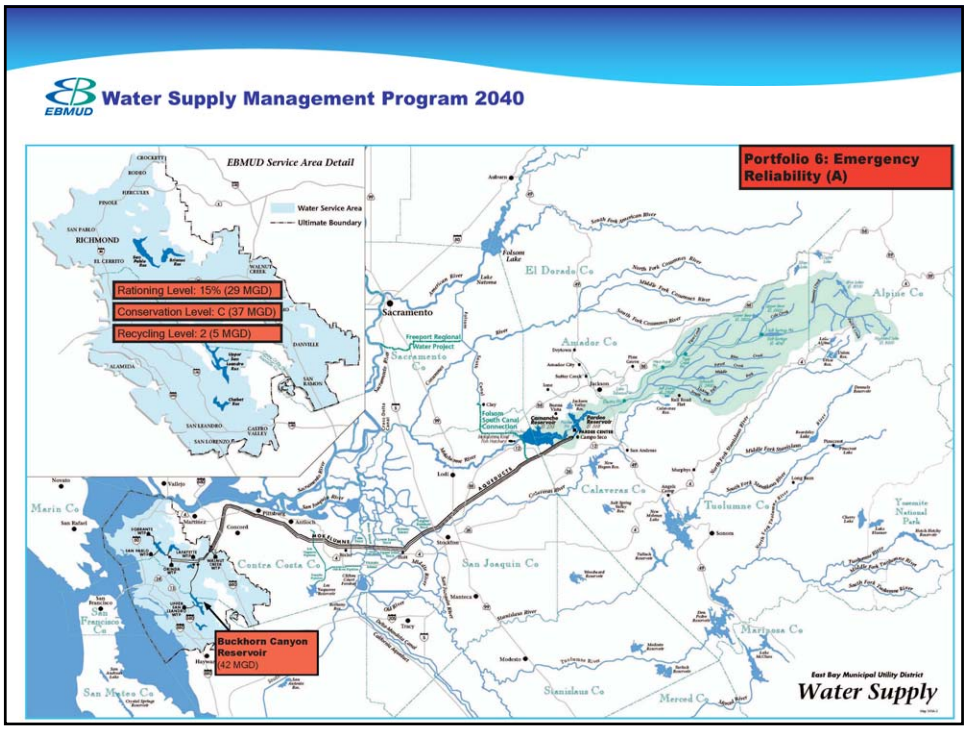

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 1: Low Customer Impact
Water Transfer
(20 MGD)
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 0%
Conservation Level: B (29 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
East Bay Municipal Utility District
Water Supply

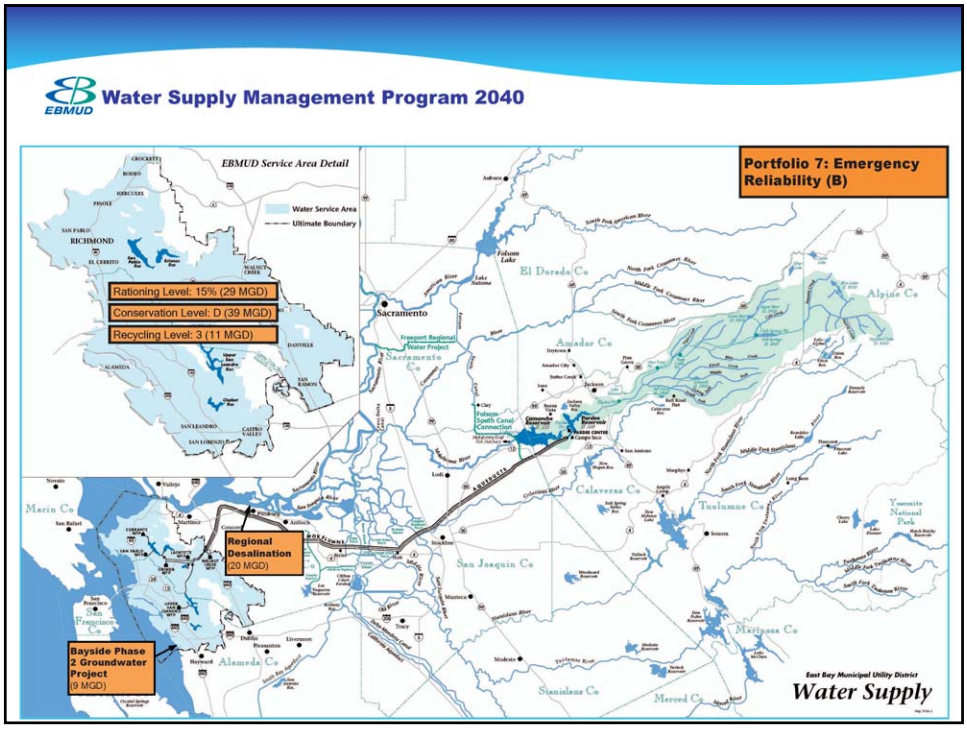

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 2: Flexibility for Future Extended Drought or Climate Change
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 0%
Conservation Level: B (29 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
Regional Desalination
(20 MGD)
East Bay Municipal Utility District
Water Supply

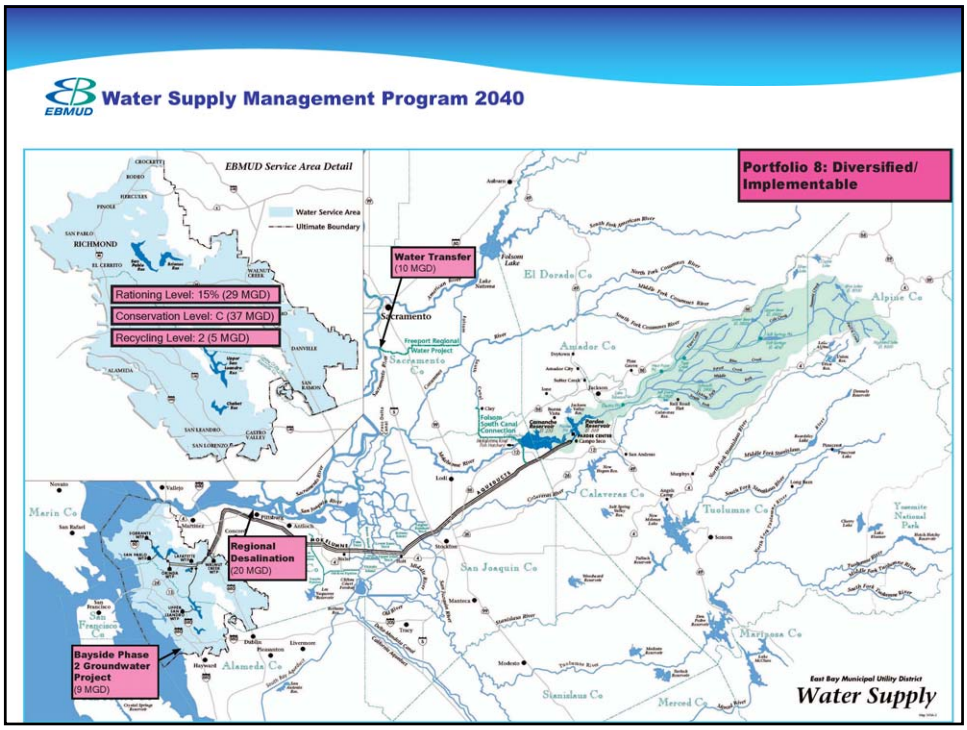

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 3: Upcountry Surface Storage Emphasis
Rationing Level: 10% (19 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 1 (0 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply

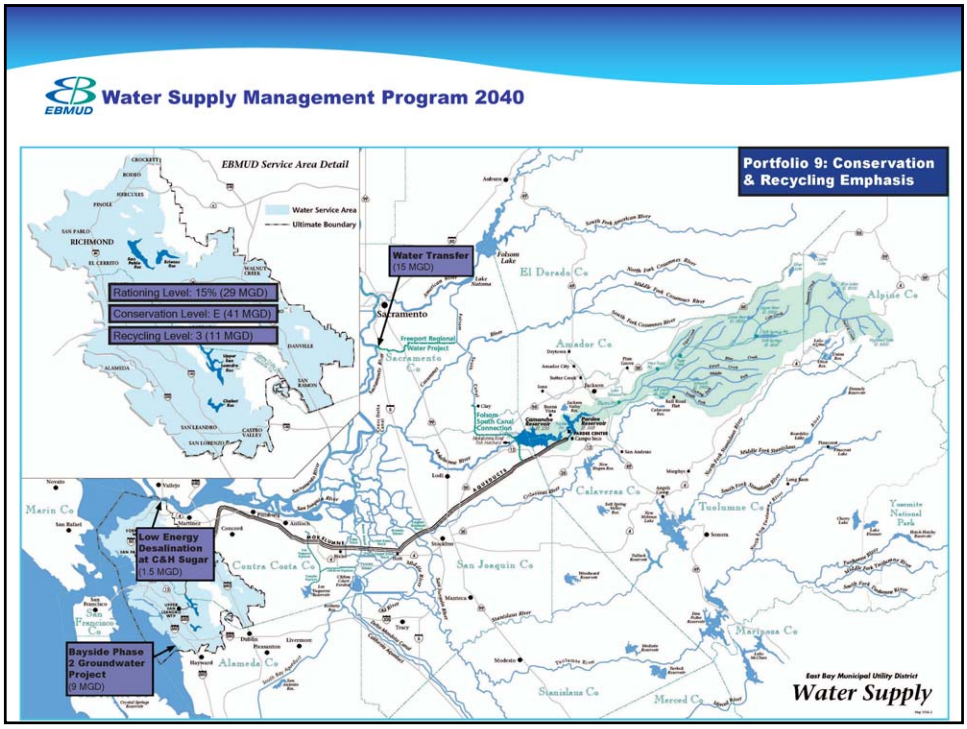

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 4: Groundwater Storage
Rationing Level: 10% (19 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 2 (5 MGD)
Water Transfer
(15 MGD)
Groundwater Banking/ Exchange (Sacramento Basin)
(4.2 MGD)
IRCUP/ San Joaquin Banking
(17.4 MGD)
Bayside Phase 2 Groundwater Project
(9 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply

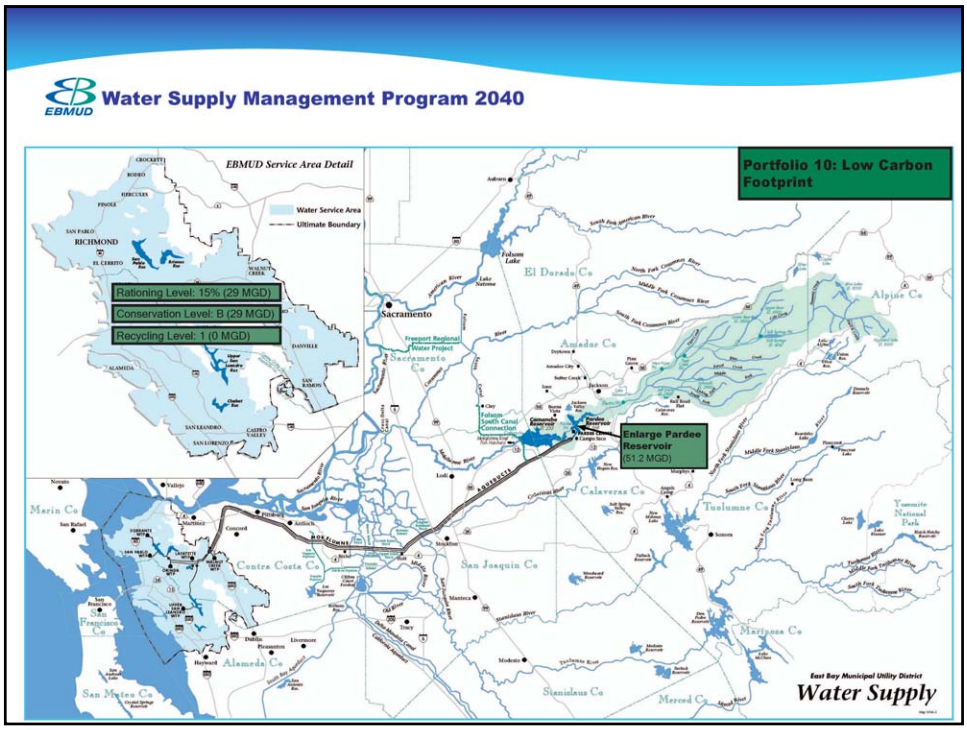

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 5: Regional Partnerships
Rationing Level: 10% (19 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Water Transfer (4.5 MGD)
Enlarge Lower Bear Reservoir (2.2 MGD)
Groundwater Banking/ Exchange (Sacramento Basin) (4.2 MGD)
IRCUP/ San Joaquin Banking (17.4 MGD)
Regional Desalination (20 MGD)
Sacramento
El Dorado Co
Amador Co
Alpine Co
Marin Co
San Joaquin Co
Tuolumne Co
Mariposa Co
Stanislaus Co
Merced Co
Alameda Co
San Mateo Co
East Bay Municipal Utility District
Water Supply

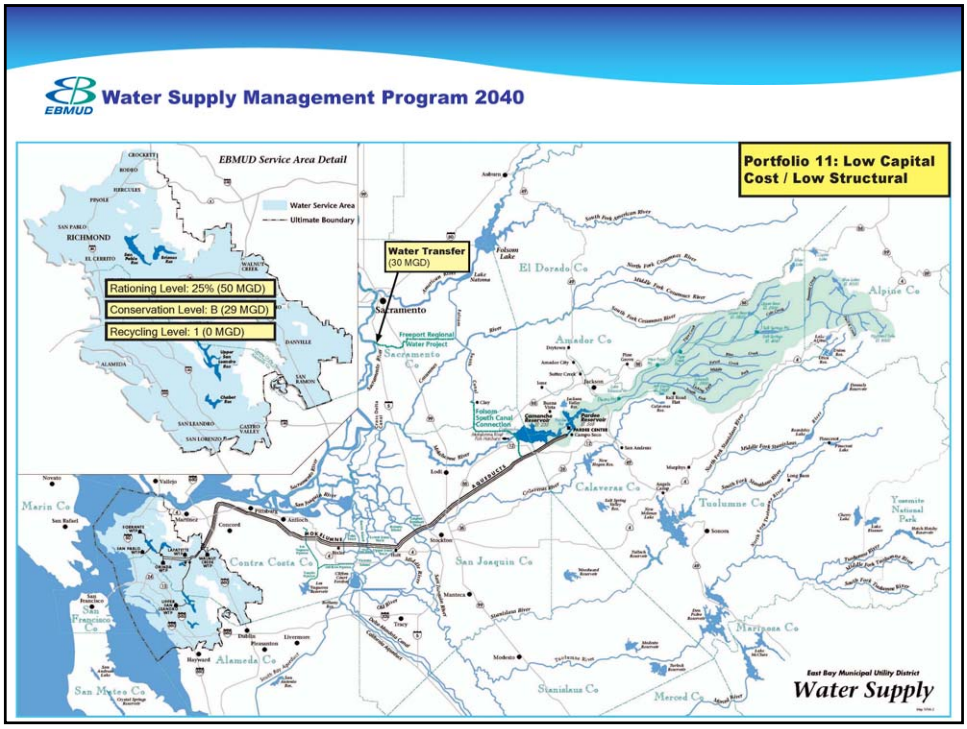

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 6: Emergency Reliability (A)
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Buckhorn Canyon Reservoir (42 MGD)
Sacramento
El Dorado Co
Amador Co
Alpine Co
Marin Co
Contra Costa Co
San Joaquin Co
Calaveras Co
Tuolumne Co
Mariposa Co
Stanislaus Co
Merced Co
San Mateo Co
East Bay Municipal Utility District
Water Supply

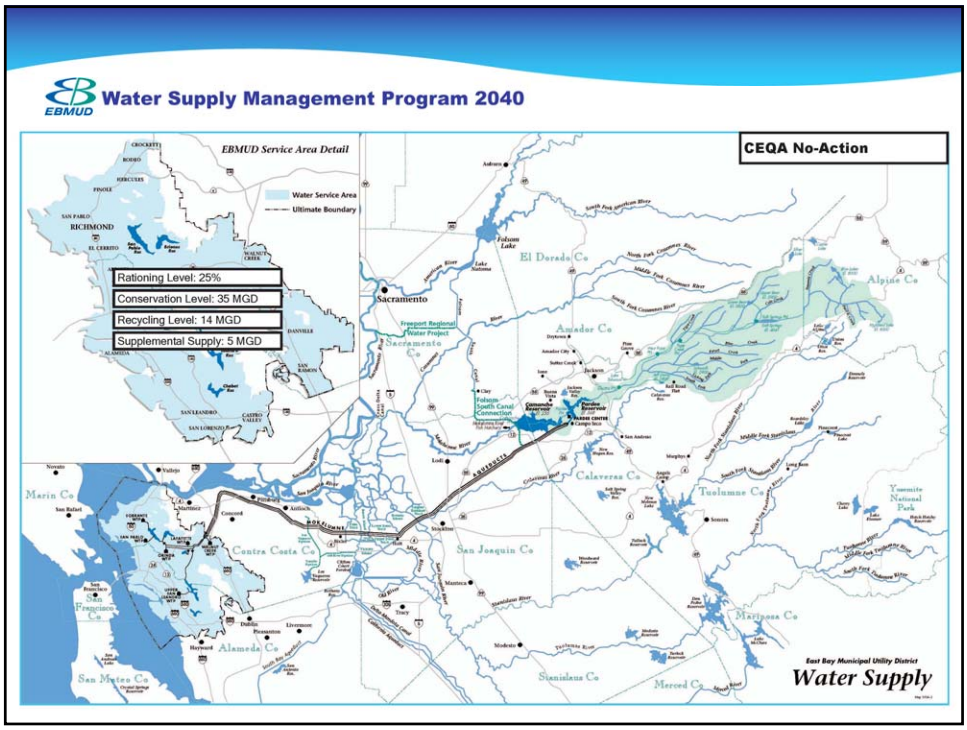

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 7: Emergency Reliability (B)
Rationing Level: 15% (29 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 3 (11 MGD)
Regional Desalination (20 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
Folsom Lake
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Alameda Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 8: Diversified/ Implementable
Water Transfer (10 MGD)
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Regional Desalination (20 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
Folsom Lake
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Alameda Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 9: Conservation & Recycling Emphasis
Water Transfer (15 MGD)
Rationing Level: 15% (29 MGD)
Conservation Level: E (41 MGD)
Recycling Level: 3 (11 MGD)
Low Energy Desalination at C&H Sugar (1.5 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
Folsom Lake
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Contra Costa Co
Alameda Co
Marin Co
San Francisco Co
San Mateo Co
Yosemite National Park
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 10: Low Carbon Footprint
Rationing Level: 15% (29 MGD)
Conservation Level: B (29 MGD)
Recycling Level: 1 (0 MGD)
Enlarge Pardee Reservoir (51.2 MGD)
Sacramento
Folsom Lake
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Contra Costa Co
Alameda Co
Marin Co
San Francisco Co
San Mateo Co
Yosemite National Park
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 11: Low Capital Cost / Low Structural
Water Transfer (30 MGD)
Rationing Level: 25% (50 MGD)
Conservation Level: B (29 MGD)
Recycling Level: 1 (0 MGD)
Sacramento
Freeport Regional Water Project
El Dorado Co
Alpine Co
Amador Co
Calaveras Co
Tuolumne Co
Marin Co
Contra Costa Co
San Joquin Co
Mariposa Co
Stanislaus Co
Merced Co
Alameda Co
San Mateo Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
CEQA No-Action
Rationing Level: 25%
Conservation Level: 35 MGD
Recycling Level: 14 MGD
Supplemental Supply: 5 MGD
Sacramento
Freeport Regional Water Project
El Dorado Co
Alpine Co
Amador Co
Calaveras Co
Tuolumne Co
Marin Co
Contra Costa Co
San Joquin Co
Mariposa Co
Stanislaus Co
Merced Co
Alameda Co
San Mateo Co
East Bay Municipal Utility District
Water Supply

Water Supply Management Program 2040

Board of Directors' Workshop #8

April 22, 2008

1

Water Supply Management Program 2040

Agenda

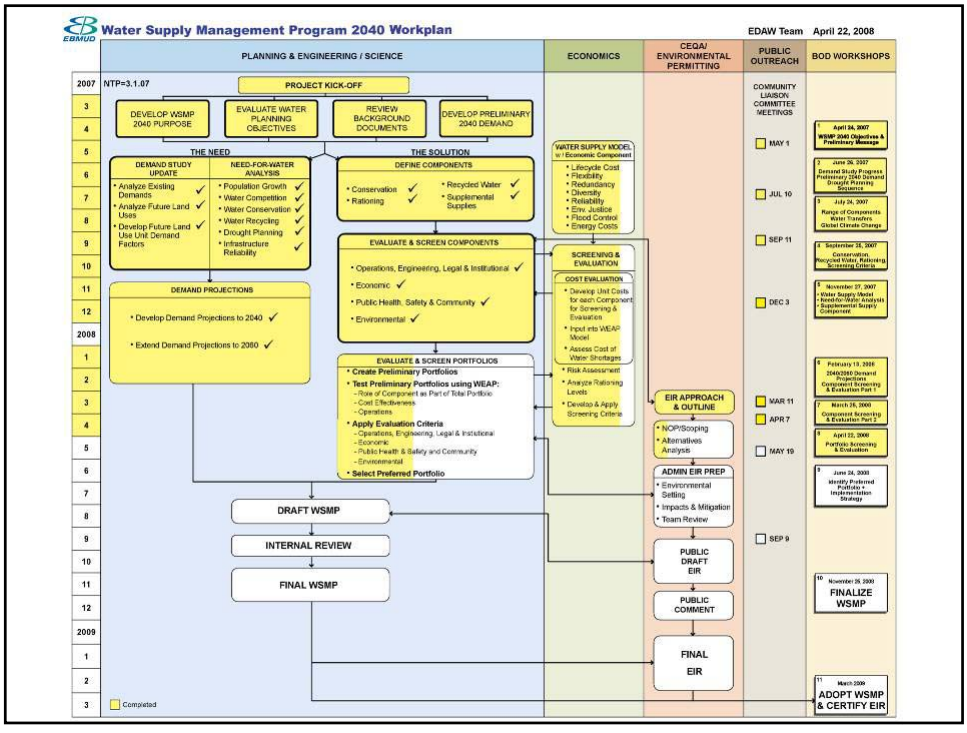
1. Project Update — 30 min
   - Workplan
   - CLC Meeting Summary: 4/7/08
2. Portfolio Screening & Evaluation — 90 min
   - Building WSMP 2040 Portfolios
   - Modeling Results
   - Portfolio Evaluation & Recommendations

2

EBMUD Water Supply Management Program 2040

Project Update

3



Water Supply Management Program 2040

Upcoming Workshops

Board Workshop #8: April 22, 2008
- Portfolio Screening & Evaluation

[May 19, 2008 CLC Meeting to follow]

Board Workshop #9: June 24, 2008
- Identify Preferred Portfolio & Implementation Strategy

[CLC Members encouraged to attend]

5

Water Supply Management Program 2040

CLC Meeting Summary

Meeting #6: April 7, 2008

6

Water Supply Management Program 2040

Primary Issues Raised
CLC #5: March 11, 2008

- CLC comfortable with transparency, clarity, and thoroughness of the WSMP 2040 planning process.

Water Shortage Costs

- Customer education regarding landscaping is important. *[A: Key part of EBMUD conservation & will continue].*
- Have market incentives been considered (like PG&E)? *[A: PG&E's pricing incentives address peak loads while EBMUD's challenge is dry-year water shortage. EBMUD currently has incentives & a tiered rate structure - further refinement of these programs would be reserved for use as tools in dry-years].*
- Tiered rates are more effective than water cops or flow restrictors. Santa Barbara's rationing system & pricing may be a good example.

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Water Supply Management Program 2040

Primary Issues Raised
CLC #6: April 7, 2008

Conservation

- Would like to see more detail on the conservation measures. *[A: Detailed materials available on website].*
- To what extent are disasters or a public health epidemic factored in the evaluation? *[A: The only emergency situation considered is a Delta failure scenario. This is the impetus for 6-month local storage (or equivalent) requirement. This will be reviewed when we evaluate 4-6 portfolios].*

Portfolio #6 – Emergency Reliability

- How long would it take to get the aqueducts back in service after a Delta failure? *[A: min. 6 months].*
- We really need to be prepared for more than 6 months!
- Better to have more storage on the west side.

8

Water Supply Management Program 2040

Primary Issues Raised
CLC #6: April 7, 2008

Portfolios #7- #14

- Portfolio #10 – Low carbon footprint: Recycling level may be too high? *[A: Pardee component has a low carbon footprint due to electricity generation. A modest-sized Recycled Water component (5 MGD), which has a fairly low carbon footprint compared to other supplemental supplies, is included in this Portfolio, along with Enlarge Pardee Reservoir, to meet the need-for-water.*
- Could an aqueduct enlargement reduce the need to pump Pardee water & thus reduce energy use? *[A: Aqueduct replacement could save energy but needs to be cost effective for WSMP 2040 & other district needs to implement].*

Portfolio Modeling

- The most useful portfolio differentiation may be to understand which are high capital costs versus those that are higher operations & maintenance costs.
- Good drought management project is one with high capital cost & low O&M.

9

Water Supply Management Program 2040

Primary Issues Raised
CLC #6: April 7, 2008

- EBMUD covers two different climate zones; need to consider this for effective implementation of portfolios.
- The portfolio with the lowest rationing level has the greatest flexibility.
- Comments from public:
  - The benefits derived from conservation are not getting adequate consideration.

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Water Supply Management Program 2040

Key Findings & Observation

Preliminary Modeling Results (Round 2)

11

Water Supply Management Program 2040

WSMP 2040 Portfolios - Preliminary Modeling Results (Round 2)

Portfolio Number		Maximum Rationing Percent	Average Annual Volume of Water (MGD) Over 3-Year Drought Planning Sequence					Rationing Frequency (No. of years in a 10-year period)	Cost[1]				Portfolio Number
			Rationing	Conservation	Recycled	Supplemental Supply	Total System		Cost of Water Shortage (Cost to Customer)		Total Portfolio Cost (Cost to District) $M/Yr	Total Capital Costs $M	
									Avg. Annual Cost $M/Yr[2]	Max Annual Cost $M/Yr			
1		0%	0.0	29.3	5.0	61.5	95.9	0.0	0.0	0.0	16.9	450	1
2		0%	0.0	29.3	5.0	61.5	95.9	0.0	0.0	0.0	16.8	440	2
3		10%	13.7	37.3	0.0	47.2	98.1	1.4	15.3	183	17.7	540	3
4		10%	19.5	39.4	5.0	45.6	109.6	1.8	15.2	182	26.9	670	4
5		10%	19.5	37.3	5.0	48.0	109.8	1.8	15.2	183	23.9	570	5
6		15%	29.4	37.3	5.0	42.0	113.7	1.9	28.0	289	15.9	500	6
7		15%	29.6	39.4	11.0	29.0	109.0	1.8	24.0	288	24.3	610	7
8		15%	29.5	37.3	5.0	39.0	110.9	1.8	24.7	289	16.0	440	8
9		15%	29.6	40.9	11.0	25.5	107.1	1.8	24.3	288	29.2	750	9
10		15%	20.5	37.3	5.0	36.1	98.9	1.4	22.2	289	19.3	590	10
11		25%	52.0	29.3	0.0	28.6	109.9	2.0	78.9	1,131	7.2	130	11
12		10%	19.5	37.3	11.0	41.3	109.1	1.8	14.8	182	24.2	610	12
13		20%	41.1	39.4	11.0	17.1	108.6	1.8	41.2	482	22.1	580	13
14		25%	52.0	37.3	11.0	9.0	109.3	2.0	73.1	1,120	17.2	450	14

Notes:

1. All cost results reflect a fixed level of demand at 2040 and the historical hydrologic sequence during the modeling period. These numbers will change when run for varying demand levels using indexed sequential modeling.
2. No rationing was imposed under Portfolios 1 and 2.

Water Supply Management Program 2040

Key Findings & Observations

Conveyance & Treatment Operations

- All portfolios except P-1 & P-2 meet the annual Need-for-Water & satisfy operational constraints.
- P-1 & P-2 do not work because of capacity limitations of the aqueducts & water treatment plants.

13

Water Supply Management Program 2040

Key Findings & Observations

Conveyance & Treatment Operations

- All portfolios except P-6 require upcountry pretreatment.
- In the 3rd year of a drought, sources other than Mokelumne water are required. Not all of these sources can be treated at existing water treatment plants. Therefore, pretreatment is needed before entering the EBMUD aqueduct system.

14

Water Supply Management Program 2040

Key Findings & Observations
Regional Desalination

- Regional Desalination component assumes location in Pittsburg.
- Desalinated water from Pittsburg would be treated a second time at EBMUD treatment plants due to transmission system configuration.
- Water cannot be delivered from Pittsburg to partners during peak summer months.
- Partners would need to fund high-cost transmission/ distribution improvements to obtain peak summer deliveries.

15

Water Supply Management Program 2040

Key Findings & Observations
P-11 & P-14 & Rationing

- P-11 & P-14 have the highest level of rationing at 25%.
- Rationing is triggered more often in these portfolios than others.
- The cost of water shortage for these portfolios is the highest.

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Water Supply Management Program 2040

WSMP 2040 Portfolios

Portfolio Screening & Evaluation

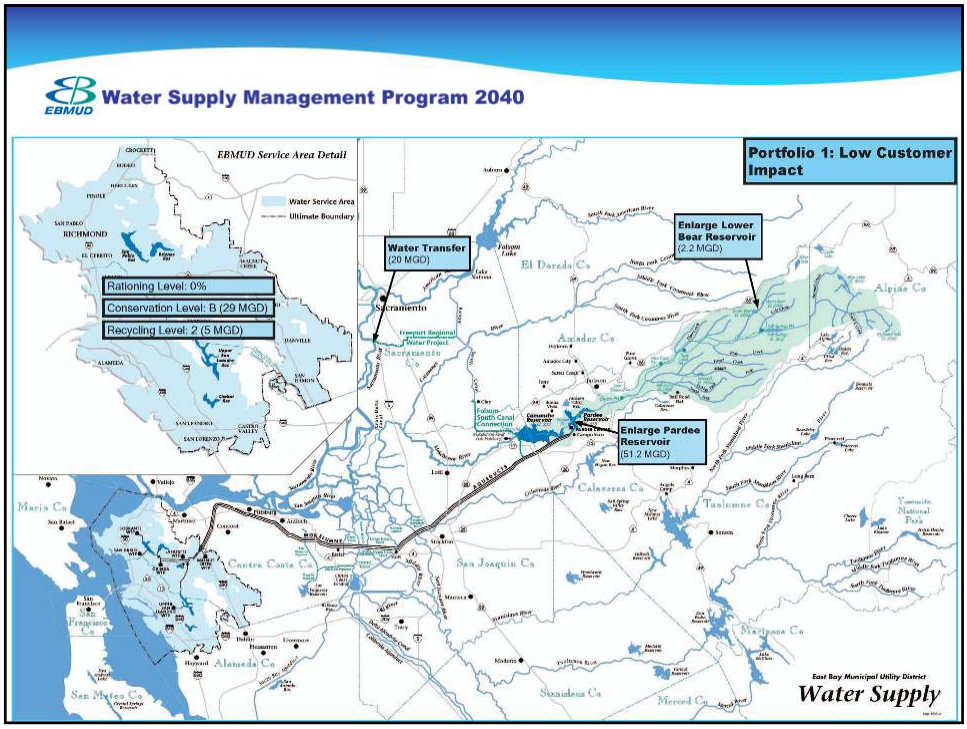
17

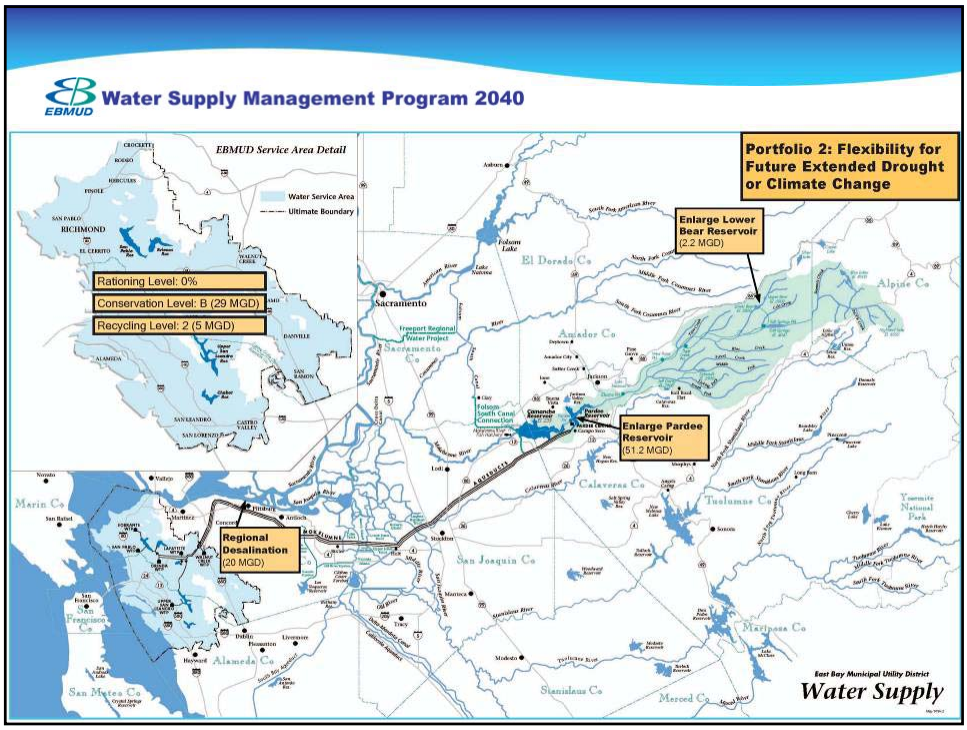
Water Supply Management Program 2040

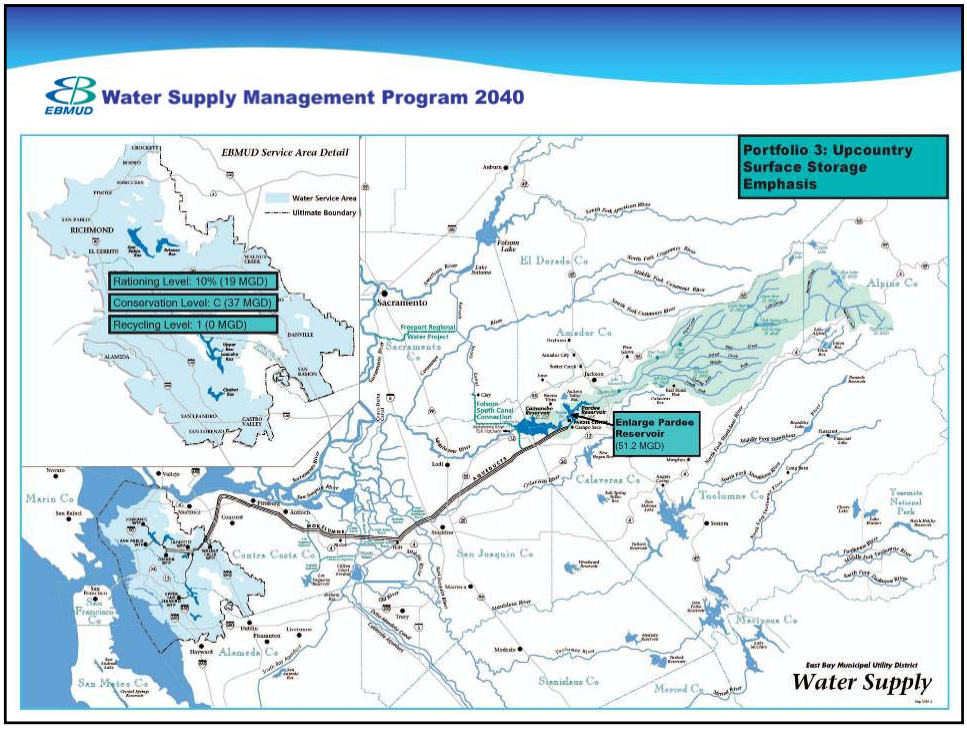
WSMP 2040 Portfolios – Criteria Evaluation

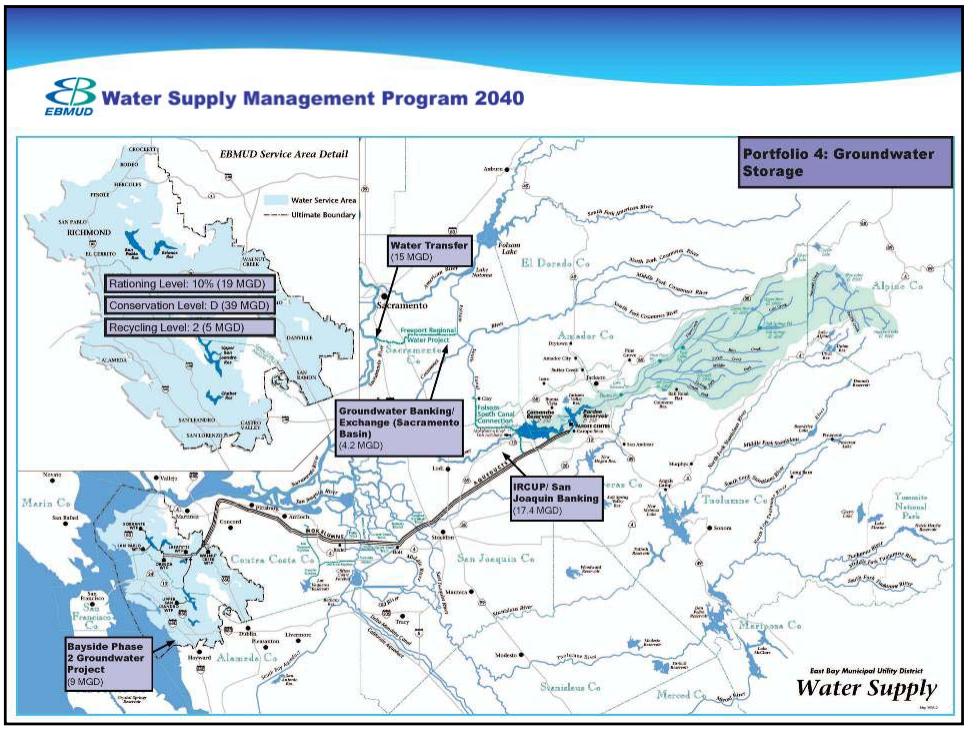
Handout

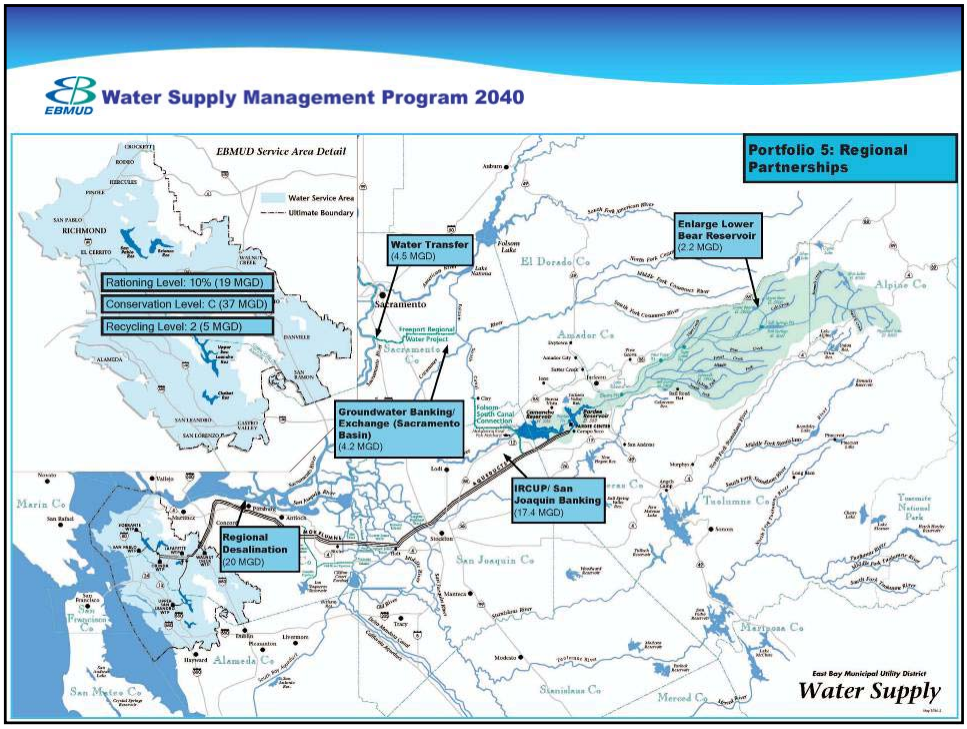
18

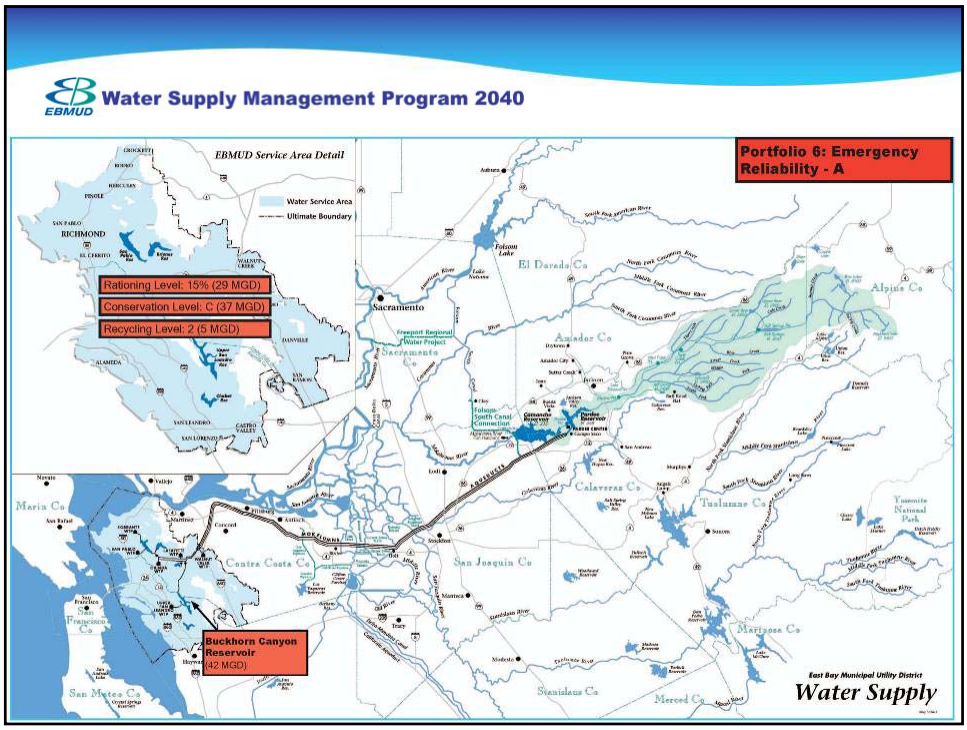

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 1: Low Customer Impact
Water Transfer
(20 MGD)
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 0%
Conservation Level: B (29 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
East Bay Municipal Utility District
Water Supply

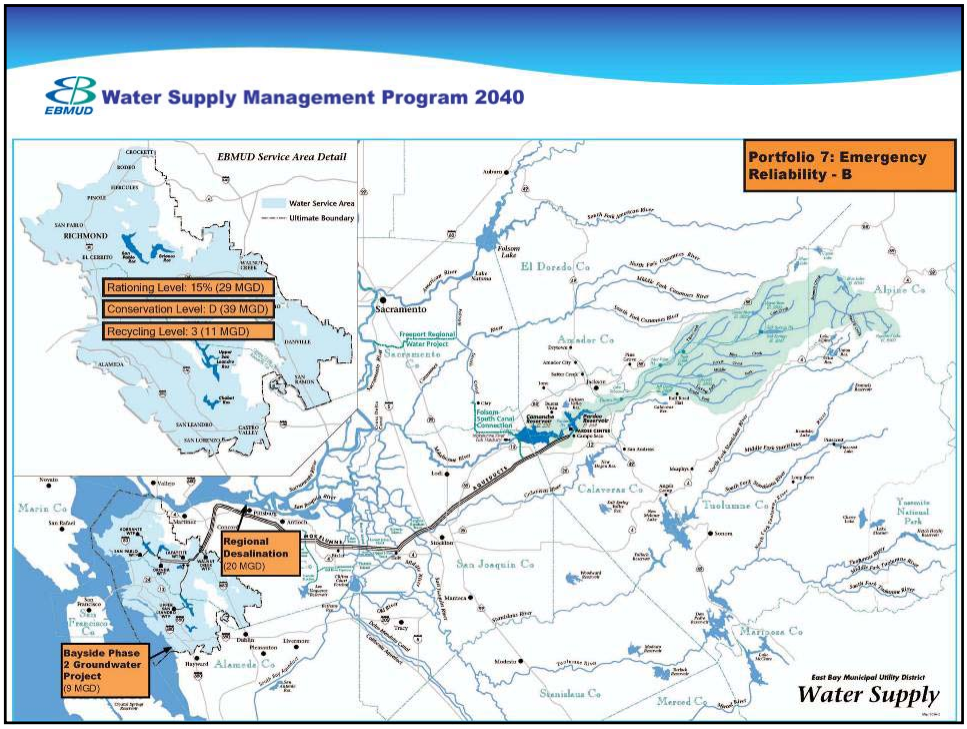

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 2: Flexibility for Future Extended Drought or Climate Change
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 0%
Conservation Level: B (29 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
Regional Desalination
(20 MGD)
East Bay Municipal Utility District
Water Supply

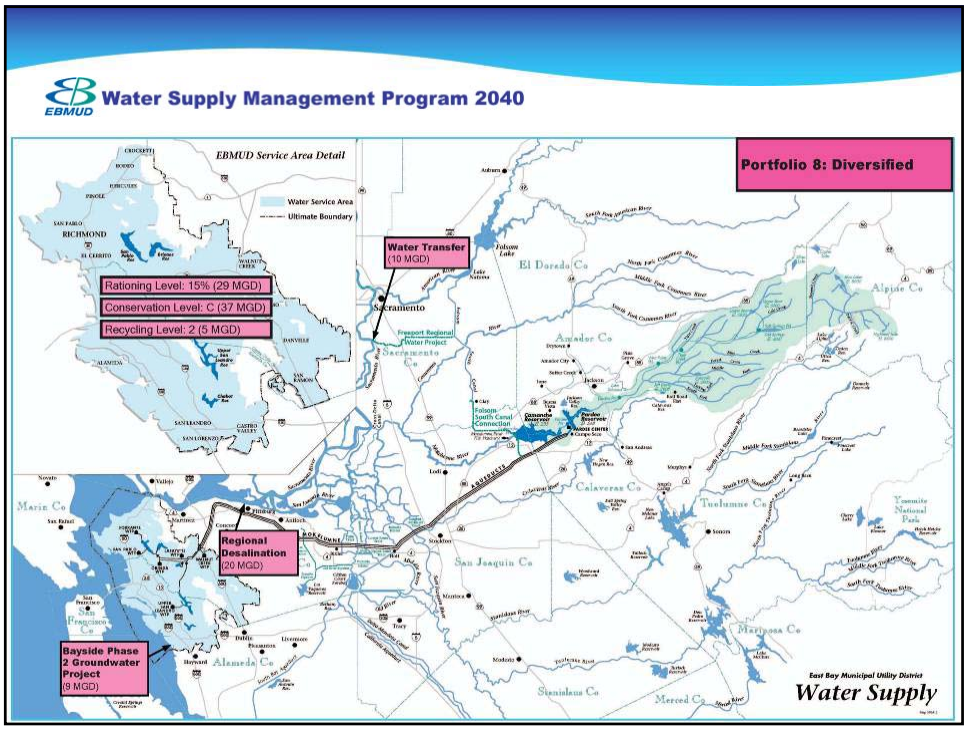

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 3: Upcountry Surface Storage Emphasis
Rationing Level: 10% (19 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 1 (0 MGD)
Enlarge Pardee Reservoir (61.2 MGD)
Sacramento
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Contra Costa Co
Alameda Co
San Mateo Co
East Bay Municipal Utility District
Water Supply

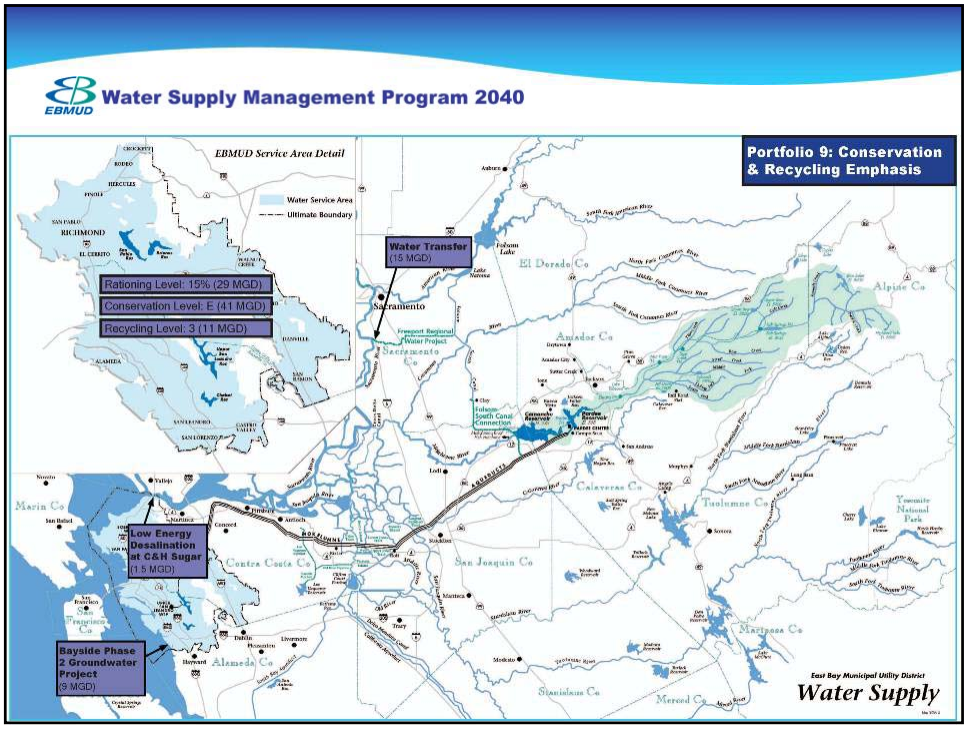

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 4: Groundwater Storage
Water Transfer (15 MGD)
Rationing Level: 10% (19 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 2 (5 MGD)
Groundwater Banking/ Exchange (Sacramento Basin) (4.2 MGD)
IRCUP/ San Joaquin Banking (17.4 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Contra Costa Co
Alameda Co
East Bay Municipal Utility District
Water Supply

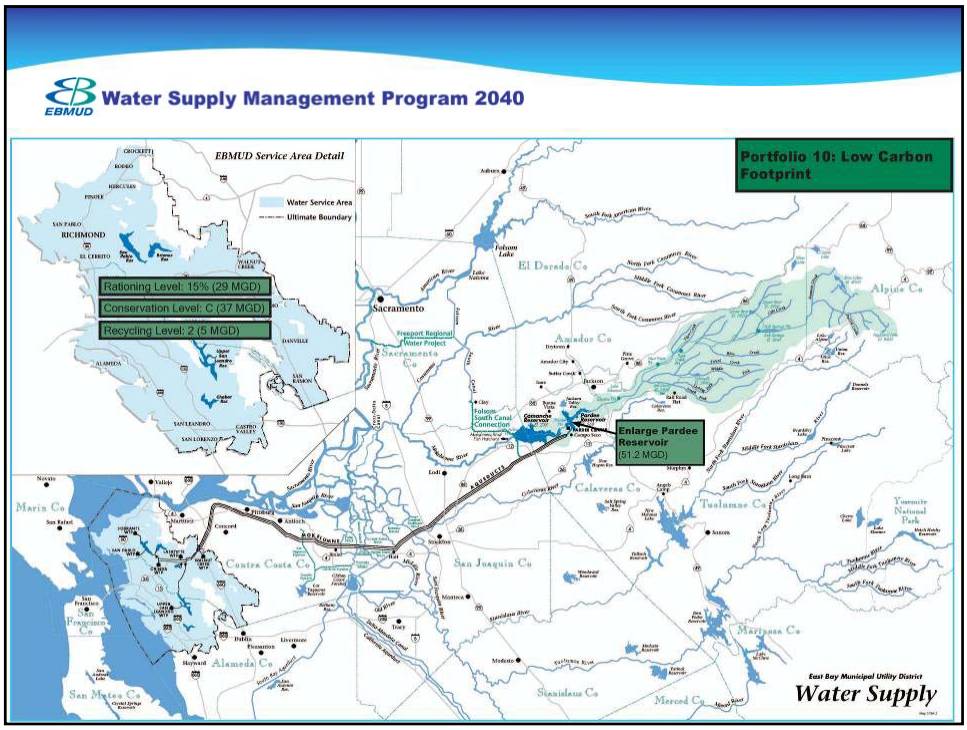

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 5: Regional Partnerships
Water Transfer (4.5 MGD)
Enlarge Lower Bear Reservoir (2.2 MGD)
Rationing Level: 10% (19 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Groundwater Banking/ Exchange (Sacramento Basin) (4.2 MGD)
IRCUP/ San Joaquin Banking (17.4 MGD)
Regional Desalination (20 MGD)
East Bay Municipal Utility District
Water Supply

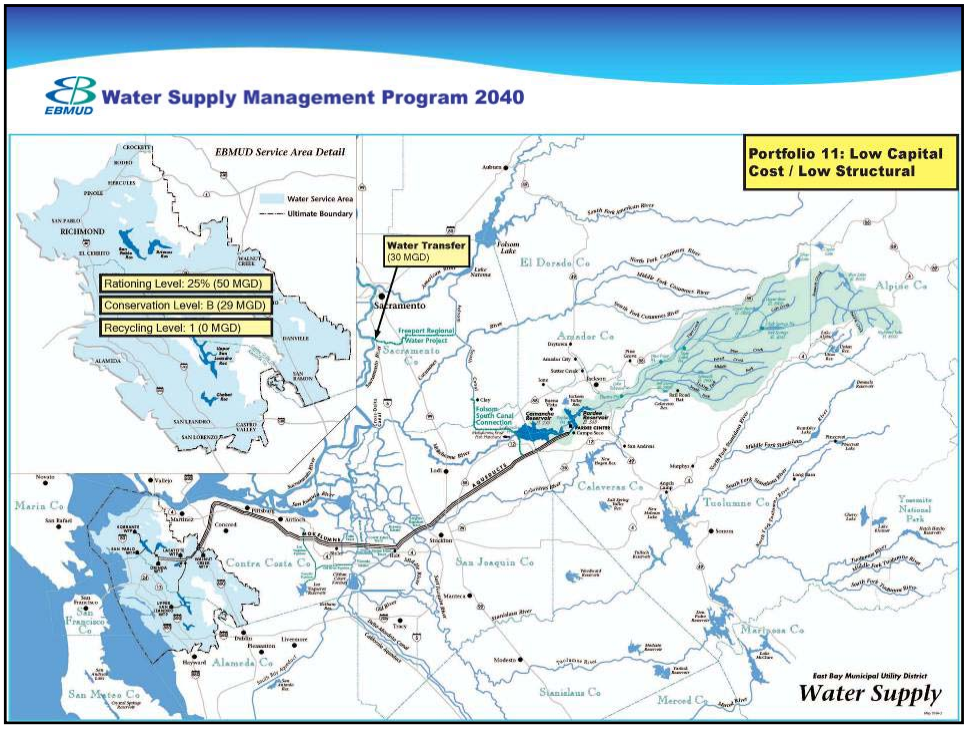

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 6: Emergency Reliability - A
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Buckhorn Canyon Reservoir (42 MGD)
East Bay Municipal Utility District
Water Supply

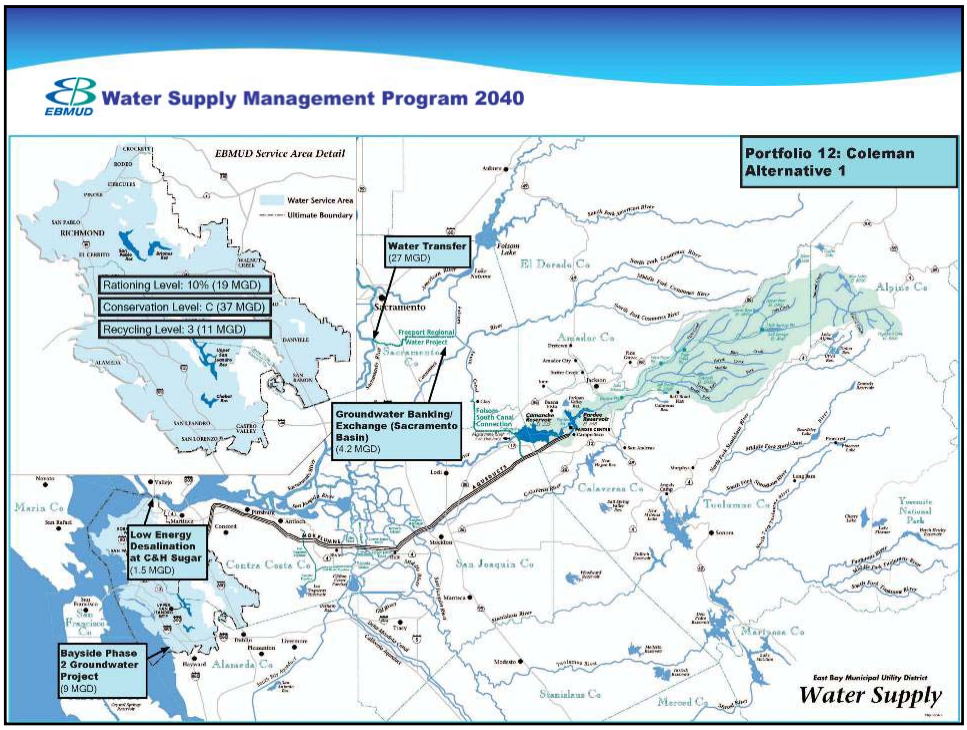

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 7: Emergency Reliability - B
Rationing Level: 15% (29 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 3 (11 MGD)
Regional Desalination (20 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply

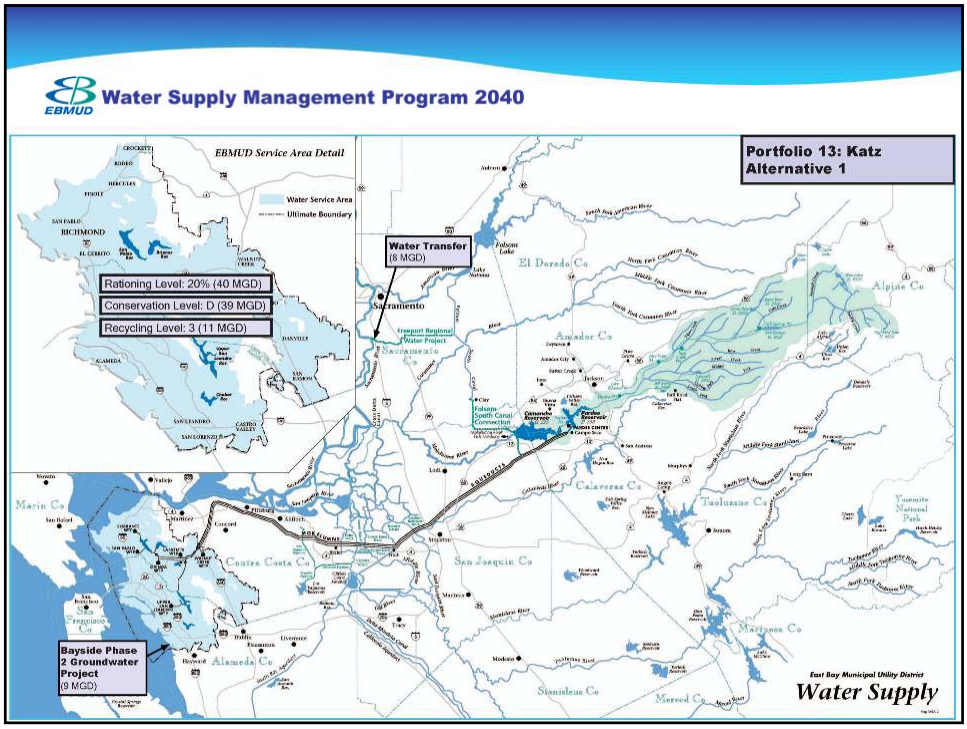

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 8: Diversified
Water Transfer (10 MGD)
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Regional Desalination (20 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply

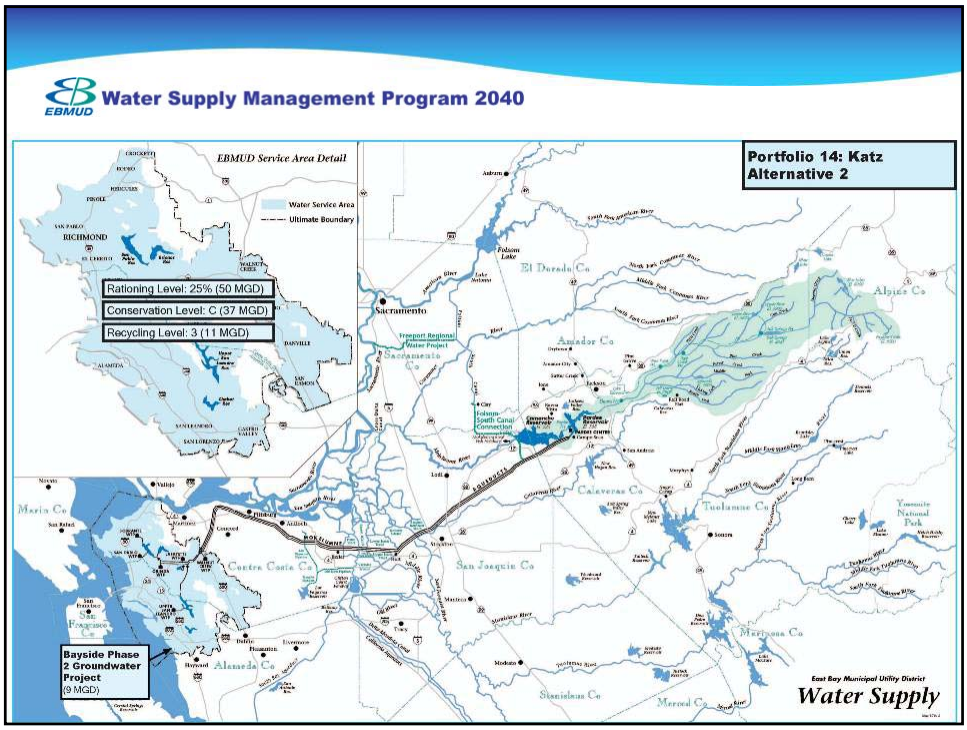

Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio 9: Conservation & Recycling Emphasis
Water Service Area
Ultimate Boundary
Water Transfer (15 MGD)
Rationing Level: 15% (29 MGD)
Conservation Level: E (41 MGD)
Recycling Level: 3 (11 MGD)
Low Energy Desalination at C&H Sugar (1.5 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
El Dorado Co
Alpine Co
Amador Co
Calaveras Co
Tuolumne Co
Marin Co
Contra Costa Co
San Joaquin Co
Alameda Co
Stanislaus Co
Merced Co
Mariposa Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio 10: Low Carbon Footprint
Water Service Area
Ultimate Boundary
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir (51.2 MGD)
Sacramento
El Dorado Co
Alpine Co
Amador Co
Calaveras Co
Tuolumne Co
Marin Co
Contra Costa Co
San Joaquin Co
Alameda Co
Stanislaus Co
Merced Co
Mariposa Co
San Mateo Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 11: Low Capital Cost / Low Structural
Water Transfer
(30 MGD)
Rationing Level: 25% (50 MGD)
Conservation Level: B (29 MGD)
Recycling Level: 1 (0 MGD)
Sacramento
Freeport Regional Water Project
El Dorado Co
Alpine Co
Amador Co
Sacramento Co
Folsom South Canal Connection
Calaveras Co
Tuolumne Co
Yosemite National Park
Marin Co
Contra Costa Co
San Joaquin Co
San Francisco Co
Alameda Co
Mariposa Co
San Mateo Co
Stanislaus Co
Merced Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 12: Coleman Alternative 1
Water Transfer
(27 MGD)
Rationing Level: 10% (19 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 3 (11 MGD)
Groundwater Banking/ Exchange (Sacramento Basin)
(4.2 MGD)
Low Energy Desalination at C&H Sugar
(1.5 MGD)
Bayside Phase 2 Groundwater Project
(9 MGD)
Sacramento
Freeport Regional Water Project
El Dorado Co
Alpine Co
Amador Co
Sacramento Co
Folsom South Canal Connection
Calaveras Co
Tuolumne Co
Yosemite National Park
Marin Co
Contra Costa Co
San Joaquin Co
San Francisco Co
Alameda Co
Mariposa Co
Stanislaus Co
Merced Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 13: Katz
Alternative 1
Water Transfer
(8 MGD)
Rationing Level: 20% (40 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 3 (11 MGD)
Bayside Phase
2 Groundwater
Project
(9 MGD)
Sacramento
El Dorado Co
Alpine Co
Amador Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Contra Costa Co
Alameda Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 14: Katz
Alternative 2
Rationing Level: 25% (50 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 3 (11 MGD)
Bayside Phase
2 Groundwater
Project
(9 MGD)
Sacramento
El Dorado Co
Alpine Co
Amador Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Contra Costa Co
Alameda Co
East Bay Municipal Utility District
Water Supply

EBMUD Water Supply Management Program 2040

Board of Directors' Workshop #9

June 24, 2008

1

EBMUD Water Supply Management Program 2040

Agenda

1. Project Update
2. Public Comment
3. Review of 5 Primary Portfolios
4. Input from CLC & Public Workshops
5. Guidance Needed

---Break---

6. Recommended Approach to Preferred Portfolio
7. Next Steps

2

EBMUD Water Supply Management Program 2040

Board Guidance Needed for Preferred Portfolio

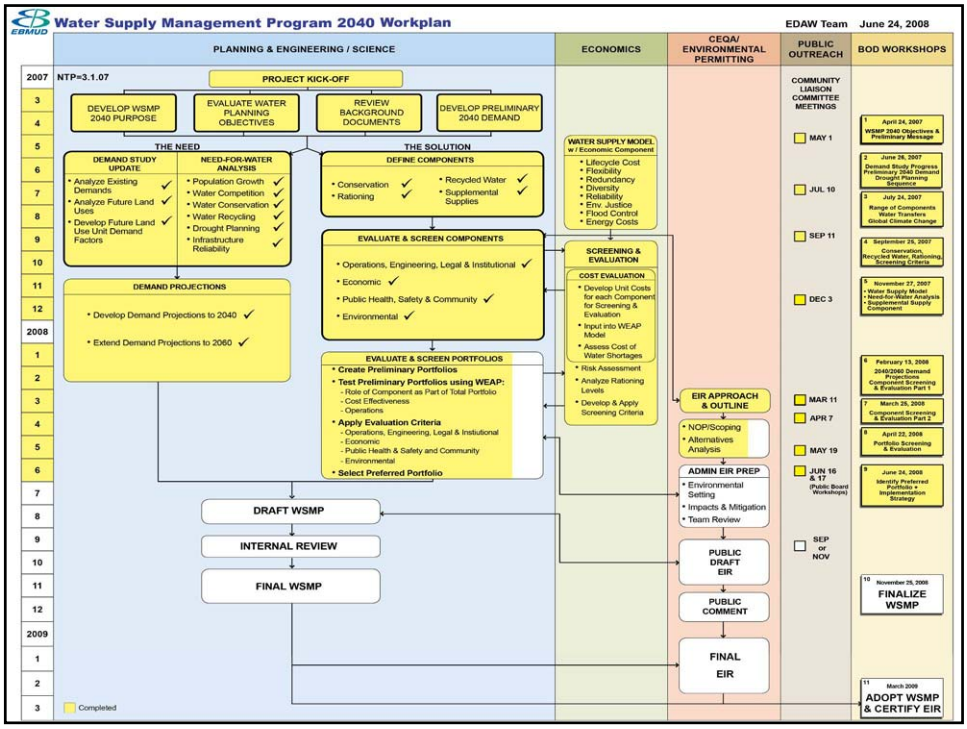
▪ Rationing Level	10% or 15% (20%?)
▪ Conservation Level	Level C or Level D?
▪ Recycling Level	5 MGD or 11 MGD?
▪ Buckhorn Reservoir	In or Out of Preferred Portfolio?
▪ Other Supplemental Supply Components	In or Out of Preferred Portfolio?
▪ Preferred Portfolio & its Components	Confirm

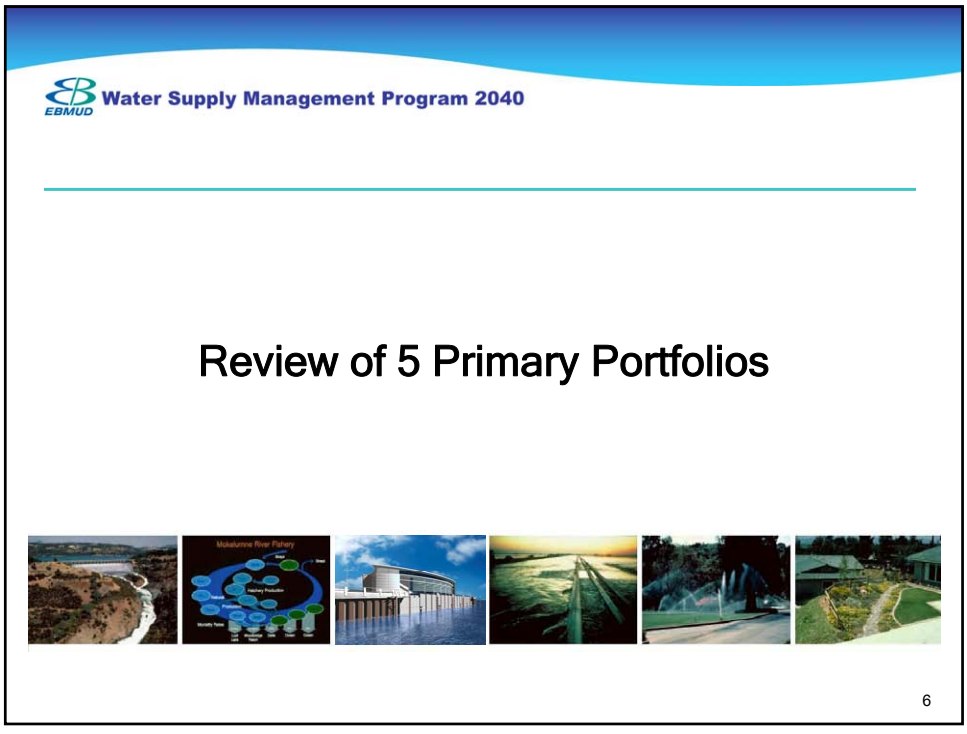
3

EBMUD Water Supply Management Program 2040

Project Update

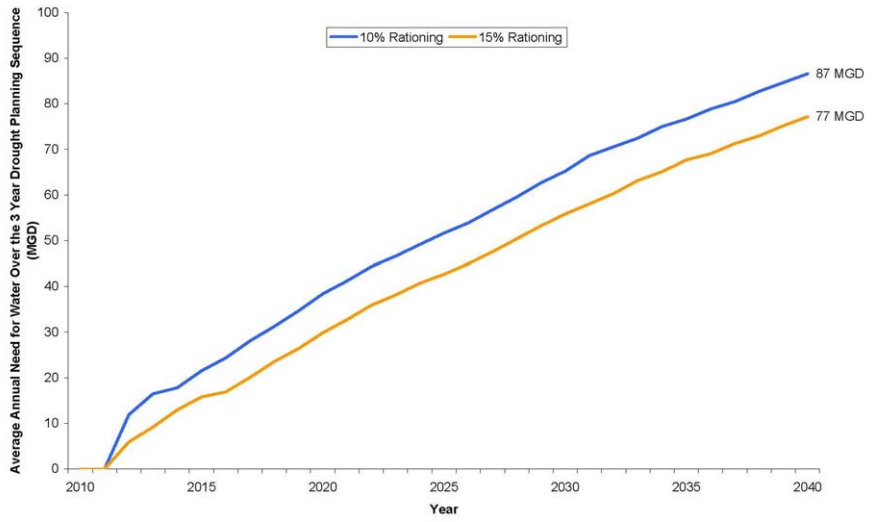
4


Water Supply Management Program 2040 Workplan
EDAW Team June 24, 2008
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
NTP=3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP PRELIMINARY 2040 DEMAND
THE NEED
THE SOLUTION
DEMAND STUDY UPDATE
NEED-FOR-WATER ANALYSIS
DEFINE COMPONENTS
EVALUATE & SCREEN COMPONENTS
DEMAND PROJECTIONS
EVALUATE & SCREEN PORTFOLIOS
WATER SUPPLY MODEL w / Economic Component
SCREENING & EVALUATION
COST EVALUATION
EIR APPROACH & OUTLINE
ADMIN EIR PREP
PUBLIC DRAFT EIR
PUBLIC COMMENT
FINAL EIR
DRAFT WSMP
INTERNAL REVIEW
FINAL WSMP
COMMUNITY LIAISON COMMITTEE MEETINGS
FINALIZE WSMP
ADOPT WSMP & CERTIFY EIR
Completed


Water Supply Management Program 2040
Review of 5 Primary Portfolios
6

EBMUD Water Supply Management Program 2040

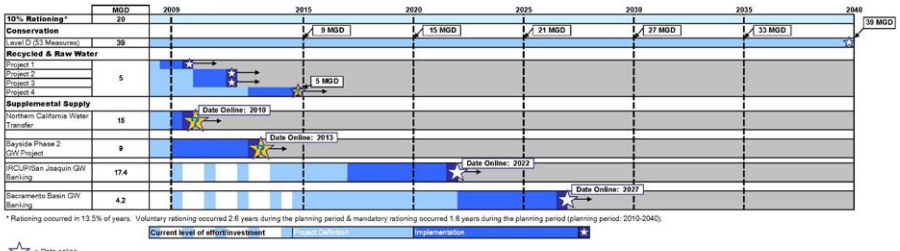
Need for Water Over Time by Rationing Level

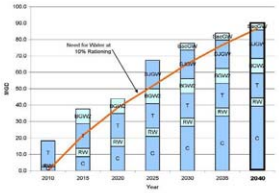


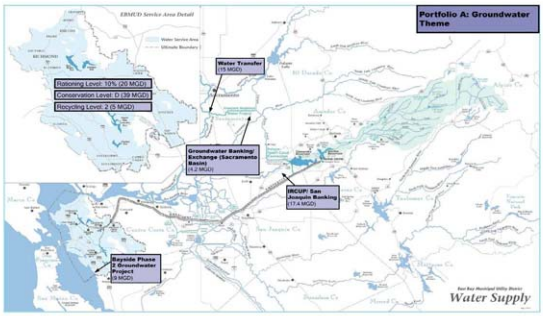
EBMUD Water Supply Management Program 2040

Portfolio A

WSMP 2040 Portfolio Phasing — Portfolio A: Groundwater Storage







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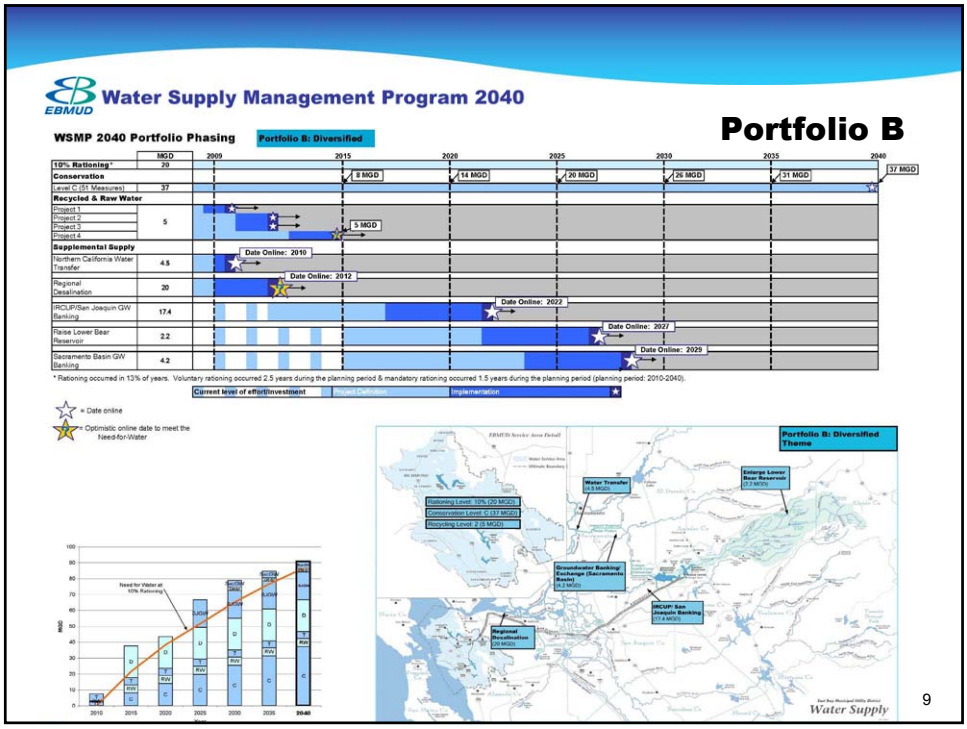
Water Supply Management Program 2040
Portfolio B
WSMP 2040 Portfolio Phasing
Portfolio B: Diversified
10% Rationing*
Conservation
Level C (51 Measures)
Recycled & Raw Water
Supplemental Supply
Northern California Water Transfer
Regional Desalination
PCL/P/San Joaquin GW Banking
Raise Lower Bear Reservoir
Sacramento Basin GW Banking
Date Online: 2010
Date Online: 2012
Date Online: 2022
Date Online: 2027
Date Online: 2029
Current level of effort/investment
Implementation
= Date online
= Optimistic online date to meet the Need-for-Water
Portfolio B: Diversified Theme
Water Supply

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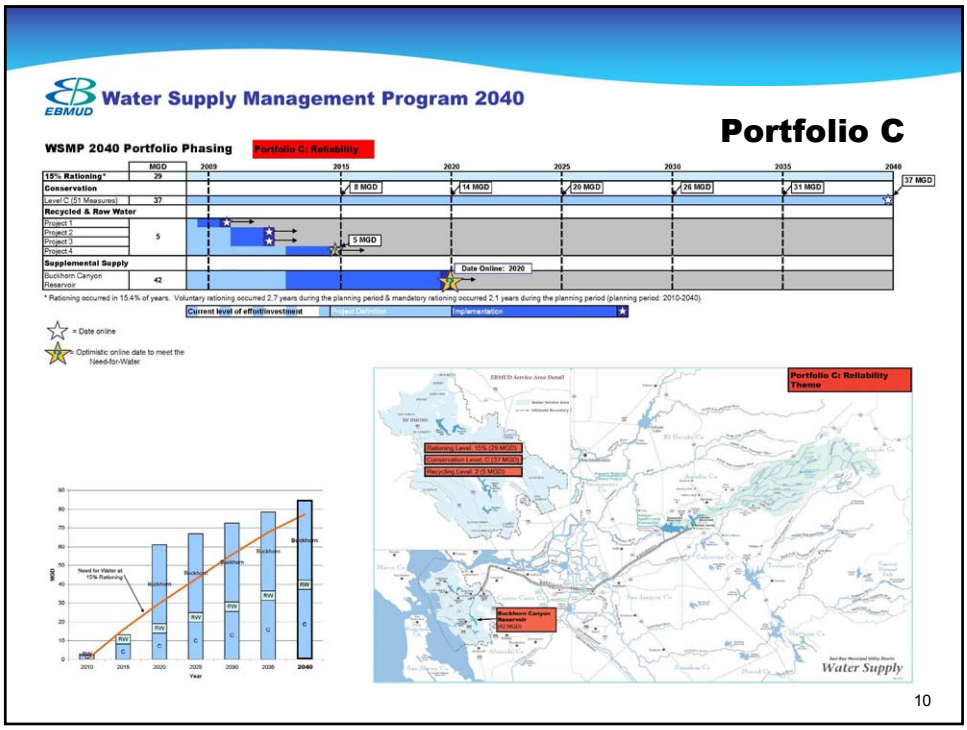
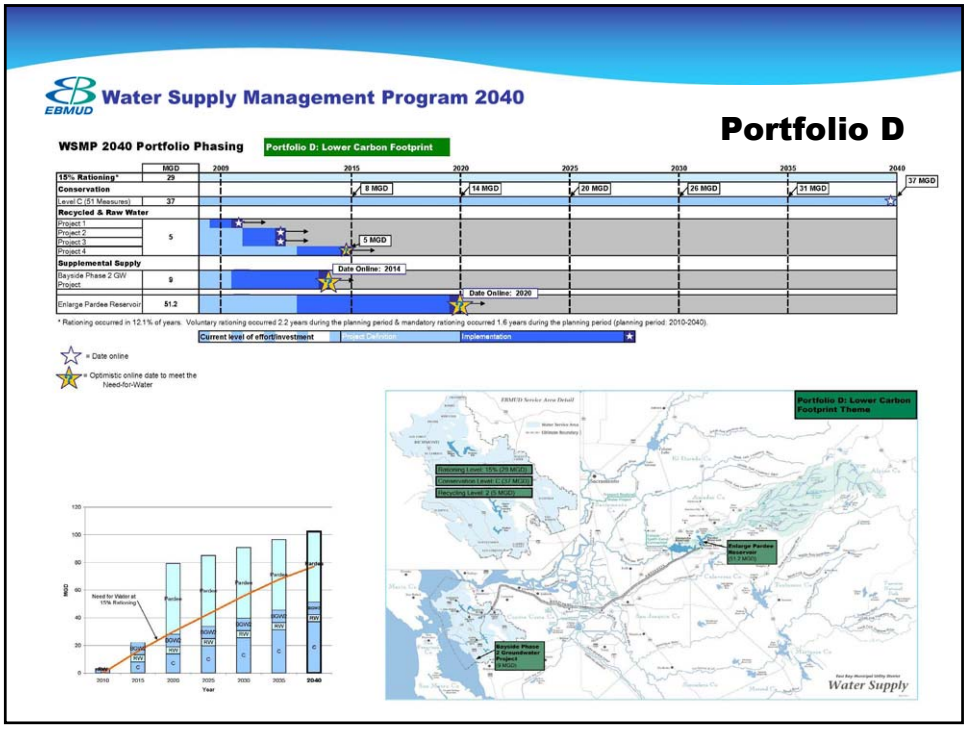
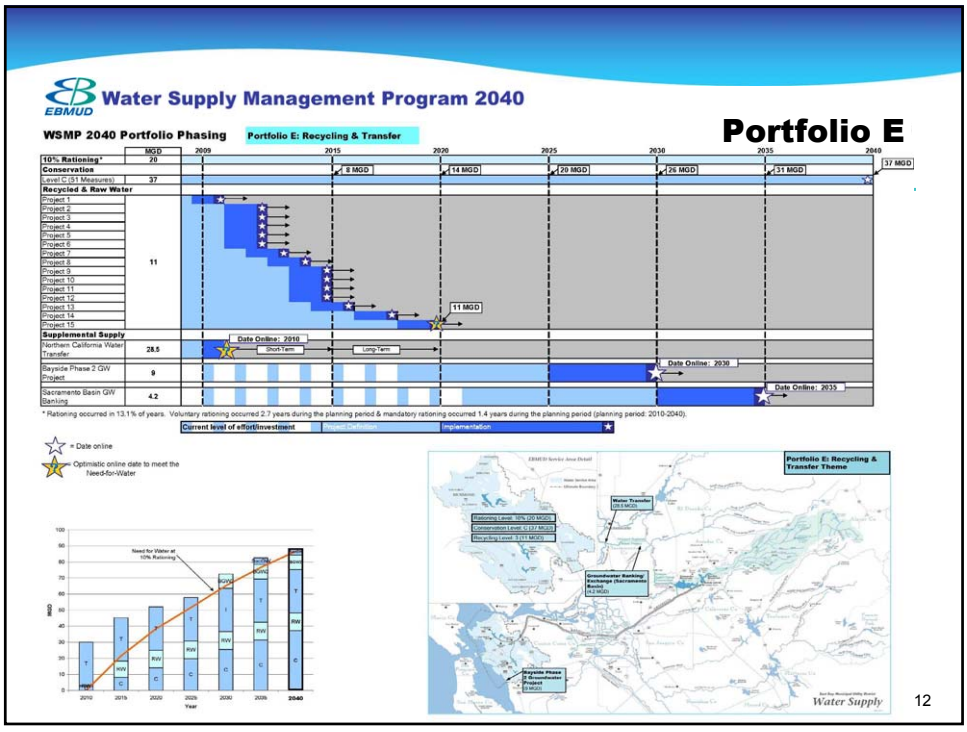

Water Supply Management Program 2040
Portfolio C
WSMP 2040 Portfolio Phasing
Portfolio C: Reliability
15% Rationing*
Conservation
Level C (51 Measures)
Recycled & Raw Water
Supplemental Supply
Buckhorn Canyon Reservoir
Date Online: 2020
Current level of effort/investment
Implementation
= Date online
= Optimistic online date to meet the Need-for-Water
Portfolio C: Reliability Theme
Water Supply

10


Water Supply Management Program 2040
Portfolio D
WSMP 2040 Portfolio Phasing
Portfolio D: Lower Carbon Footprint
15% Rationing*
Conservation
Level C (51 Measures)
Recycled & Raw Water
Supplemental Supply
Bayside Phase 2 GW Project
Enlarge Pardee Reservoir
8 MGD
14 MGD
20 MGD
26 MGD
31 MGD
37 MGD
5 MGD
Date Online: 2014
Date Online: 2020
Current level of effort/investment
Implementation
= Date online
= Optimistic online date to meet the Need-for-Water
Need for Water at 15% Rationing
Year
Portfolio D: Lower Carbon Footprint Theme
Water Supply


Water Supply Management Program 2040
Portfolio E
WSMP 2040 Portfolio Phasing
Portfolio E: Recycling & Transfer
10% Rationing*
Conservation
Level C (51 Measures)
Recycled & Raw Water
Supplemental Supply
Northern California Water Transfer
Bayside Phase 2 GW Project
Sacramento Basin GW Banking
8 MGD
14 MGD
20 MGD
26 MGD
31 MGD
37 MGD
11 MGD
Date Online: 2010
Short-Term
Long-Term
Date Online: 2030
Date Online: 2035
Current level of effort/investment
Implementation
= Date online
Optimistic online date to meet the Need-for-Water
Need for Water at 10% Rationing
Year
Portfolio E: Recycling & Transfer Theme
Water Supply

Water Supply Management Program 2040

Primary Portfolio Evaluation

Portfolio Number	Portfolio	Portfolio Theme	Operations, Engineering, Legal & Institutional				Economic		Public Health, Safety & Community		Environmental		Portfolio
			• Minimize the vulnerability & risk of disruptions (i.e., **reliability**).	• Maximize the system's **operational flexibility**.	• Minimize **institutional & legal complexities** & barriers.	• Maximize **partnerships** & regional solutions.	• Minimize the financial **cost** to the **District** of meeting customer demands for given level of system reliability.	• Minimize **customer** water shortage **costs**.	• Minimize potential adverse impacts to the **public health** of District customers. • Maximize use of water from the **best** available **source**.	• Minimize long-term adverse **community impacts** • Minimize adverse **social effects**. • Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	• Minimize adverse **impacts** on the **environment**. • Minimize construction & operation effects on environmentally **sensitive resources**.	• Minimize short term & long term **greenhouse gas emissions** from construction. • Maximize **energy efficiency** associated with operations & maintenance. • Maximize contributions to **AB 32 goals**.	
4	A	Groundwater	L	H	L	H	L	H	M	M	H	M	A
5	B	Diversified	H	M	L	H	M	H	L	M	M	L	B
8	C	Reliability	H+	H+	M	L	H	L	M	L	L	M	C
10	D	Lower Carbon Footprint	L	H	M	M	M	M	H+	M	M	H	D
12	E	Recycling & Transfer	L	H	L	H	L	H	M	M	H	M	E

H = High Response to Evaluation Criteria; L = Low Response to Evaluation Criteria

Water Supply Management Program 2040

Cost Summary of Components

Cost Ranking	Component	Project Name	Dry Year Unit Cost ($/AF)
1	Supplemental Supply	Northern California Water Transfers	$630
2	Supplemental Supply	Buckhorn Canyon Reservoir	$710
3	Supplemental Supply	Enlarge Pardee Reservoir	$730
4	Supplemental Supply	Enlarge Lower Bear Reservoir	$840
5	Supplemental Supply	Bayside Phase 2 Groundwater Project	$890
6	Supplemental Supply	IRCUP/San Joaquin Banking/Exchange	$1,210
7	Recycling	Recycling Level 2 (5 MGD)	$1,580
8	Supplemental Supply	Groundwater Banking/Exchange (Sacramento Basin)	$1,940
9	Supplemental Supply	Regional Desalination	$1,940
10	Recycling	Recycling Level 3 (11 MGD)	$3,010[1]
11	Conservation	Conservation Level C	$3,200
12	Conservation	Conservation Level D	$13,400[2]

[1]Incremental cost of additional 6 MGD supplied by Recycling Level 3.

[2]Incremental cost of additional 2 MGD supplied by Conservation Level D.

Source: March 21, 2008 Cost Tech Memo

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EBMUD Water Supply Management Program 2040

Cost Summary of Portfolios

Portfolio	Total Cost (NPV)	Rate Increase (%)
A	$543 M	12.7
B	$524 M	12.8
C	$449 M	11.7
D	$510 M	13.2
E	$598 M	12.3

NPV = Net Present Value

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EBMUD Water Supply Management Program 2040

Feedback from CLC Meeting #7

May 19, 2008

June 12, 2008

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Water Supply Management Program 2040

CLC Feedback for Portfolio A - Groundwater

PRO

+ Widest range of benefits, would promote regional cooperation (SF)

+ Least environmental impacts (JL) & encourage efficiency in Ag sector (LH)

+ Provides a safety net (HK), diverse supply increases likelihood of success (WG)

CON

- Must overcome public objections to Bayside PH 2 (HK)

- Costly, high dependence on complicated transfers, difficult to implement (WG, SF)

First Choice	Second Choice	Third Choice
Laura Harnish	Charles Brydon	Merlin Edwards
Stuart Flashman	Betty Graham	Howard Kerr
David Nesmith		Walt Gill
Julia Liou		Michael Hanemann
Eleanor Loynd		

17

Water Supply Management Program 2040

CLC Feedback for Portfolio B - Diversified

PRO

+ Opportunity to partner with others (ME)

+ Diversifies supply off Mokelumne River (JL)

+ Greatest diversity & flexibility (BG), less dependant on transfers then A (WG, HK, CG), more leverage to adapt to population growth (ME)

+ Desal technology may become more economical (ME); Good with renewable energy sources (LH)

CON

- Requires much cooperation of Agencies (HK)

- Unless cost of Desal & Recycling decrease, it is too expensive (SF)

First Choice	Second Choice		Third Choice
Merlin Edwards	David Nesmith	Julia Liou	Laura Harnish
Betty Graham	Walt Gill	Michael Hanemann	
Charles Gilcrest	Howard Kerr	Eleanor Loynd	
	Stuart Flashman		

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Water Supply Management Program 2040

CLC Feedback for Portfolio C - Reliability

PRO

+ Optimum control in case of drought or seismic event (CB), certainty of supply within District's control (WG)
+ Reliability is critical (KH)
+ On EBMUD property, on cooler side of District, provides winter storage (HK)
+ Lowest cost to implement (HK, CG)

CON

- "Go-it-alone" strategy will be hard to justify in the future (SF)
- Delta-earthquake scenario should be dealt with by securing the aqueducts (SF)
- Surface storage eliminates wetlands and habitat (DN)
- Still faces significant community opposition (CG)

First Choice		Second Choice	Third Choice
Charles Brydon Walt Gill Howard Kerr	Michael Hanemann Kris Hunt	Merlin Edwards Charles Gilcrest	-

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Water Supply Management Program 2040

CLC Feedback for Portfolio D – Lower Carbon Footprint

PRO

+ If D was managed properly, it could benefit the environment (more water for fish) (SF)
+ Meets carbon reduction issue, provides reserve source of supply (CB, EL)

CON

- Bayside (PH2) will be more trouble then you anticipate. Legal Challenges are not worth the 9 MGD. (CG)
- Portfolio not cooperative enough (SF)
- Without EIR/details of operation difficult to assess (LH)
- Secure the aqueducts first, then raise Pardee (CB, MH)

First Choice	Second Choice	Third Choice	
-	Kris Hunt	Charles Brydon Charles Gilcrest* (*without Bayside) Stuart Flashman (1/2)	Julia Liou Eleanor Loynd

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Water Supply Management Program 2040

CLC Feedback for Portfolio
E – Recycling & Transfer

PRO

+ Higher levels of Recycling is direction CA needs to go to leave more water for ecosystem purposes. EBMUD can be a pioneer for this. (LH)

+ Using renewables to meet high energy demand would be a plus. (LH)

+ Use water multiple times (recycling) and more wisely (conservation) makes the system more reliable and environmentally sustainable. (DN)

CON

- Transfers would promote regional cooperation, but may be risky long-term. (SF)

- Desal very costly. (KH)

First Choice	Second Choice	Third Choice
-	Laura Harnish	David Nesmith Stuart Flashman (1/2) Kris Hunt

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Water Supply Management Program 2040

CLC Feedback - General

- Consider conducting a NEPA-like analysis with equal level of detail of all primary portfolios instead of choosing a preferred. (Laura Harnish)

- I recommend the Board make a wise decision. (Henry Gardner)

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Water Supply Management Program 2040

Big Messages from the CLC

- Wide Range of Opinions/Preferences
- Cluster around Minimal Environmental Impact (Groundwater & Water Transfer)
- Cluster around Diversification of Supply
- Cluster around Reliability/West of Delta Solution

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Water Supply Management Program 2040

Public Workshops - June 16 & 17

28 attendees, 20 commented

- Use water more wisely: maximize conservation, rationing & recycling
- Support local community rainwater catchment, graywater & stormwater systems
- No new dams
- Buckhorn: many (14) opposed due to considerable environmental impacts, but also some proponents (2)
- Use pricing & education to increase perceived value of water; provide increased conservation incentives
- Given Global Climate Change, EBMUD can provide leadership to change how water is being valued & used

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Water Supply Management Program 2040

Website/Mail Comments Received

3 comments received via the website or mail

- Support:
  - 20% rationing or more during droughts
  - Maximum conservation (i.e., Conservation Level D or better)
  - Optimize use of groundwater storage
- Oppose:
  - New surface reservoirs or expansion of existing
  - Cross-Delta water transfers

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Water Supply Management Program 2040

LA Water Plan – Recent Announcement

DATE: May 15, 2008 17:18:18 PST

FOR IMMEDIATE RELEASE

LADWP NEWS

LOS ANGELES DEPARTMENT OF WATER AND POWER
111 North Hope St., Room 1520, Los Angeles, CA. 90012-5701
Phone (213) 367-1361 • After Hours (213) 367-3227
www.ladwp.com

MAYOR VILLARAIGOSA, LADWP UNVEIL FAR-REACHING 20-YEAR WATER STRATEGY FOR LA

To meet 100% of new water demand by 2030, unprecedented plan calls for 6-fold increase in water recycling and ramped up enforcement of water restrictions

LOS ANGELES - Unveiling a plan to ensure water continues to flow in Los Angeles despite a worsening outlook, Mayor Antonio Villaraigosa today laid out a long-term strategy for the City to meet an expected growth in water demand over the next 20 years with aggressive conservation and an unprecedented water recycling program.

"LA's future depends on our willingness to adopt an ethic of sustainability. If we don't commit ourselves to conserving and recycling water, we will tap ourselves out," said Mayor Villaraigosa.

"This plan makes a basic promise to our kids: We are going to recycle and conserve enough water to meet 100% of new demand."

By 2030, the population of Los Angeles is expected to jump by 500,000 people, according to the Southern California Association of Governments, pushing up water demand in the City by 100,000 acre-feet per year, or 15 percent.

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Water Supply Management Program 2040

LA Water Plan – A Comparison with EBMUD WSMP 2040

- LADWP Current Sources: 53% MWD, 35% Owens Valley, 11% Local Groundwater, 1% Recycling
  - LADWP 2030 plan goal: recycling to 6%
- With RARE, 4% of EBMUD deliveries will be recycled water
  - EBMUD WSMP 2040 will increase recycling to 6% - 8%
- LADWP – "All new demand with recycled and conservation", no planned rationing (but will include water restrictions)
- EBMUD – rationing is planned component of solution; rationing, new conservation, & new recycling will meet future demand growth of 66 mgd in 2040
- LADWP 2030 plan does include supplemental supply projects: conjunctive use, surface water storage, & desalination

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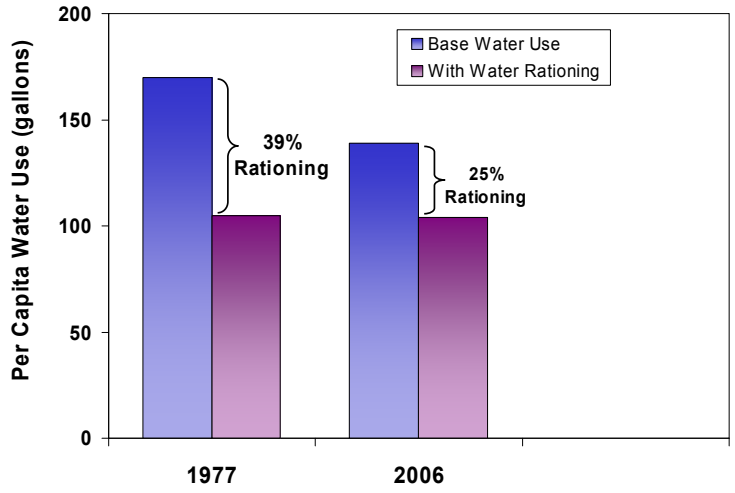
Water Supply Management Program 2040

Rationing Level

28

Water Supply Management Program 2040

Potential Demand Hardening Effect on Future Ability to Ration



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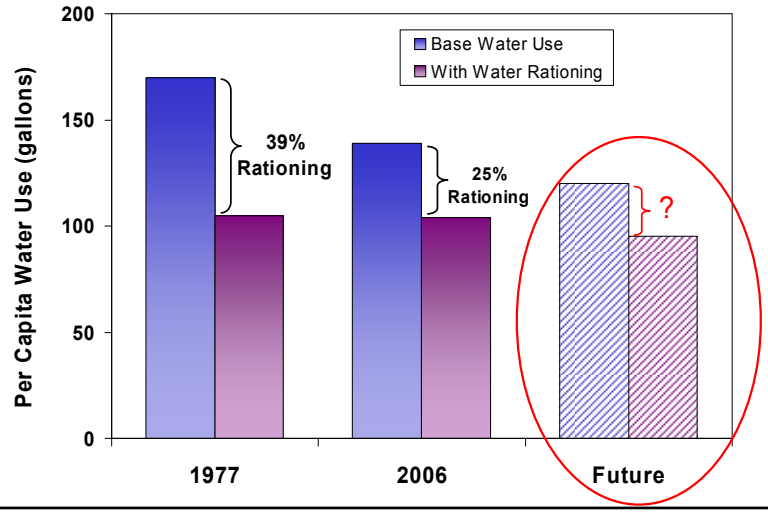
Water Supply Management Program 2040

Potential Demand Hardening Effect on Future Ability to Ration



30

Water Supply Management Program 2040

Rationing Level - Frequency

• Observation: At a 15% rationing goal, mandatory rationing occurs 30% more frequently than at a 10% rationing goal.

Rationing Goal	Years of Voluntary Rationing During the Planning Period	Years of Mandatory Rationing During the Planning Period
10%	2.6	**1.5**
15%	2.8	**2.0**

Planning Period = 2010-2040

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Water Supply Management Program 2040

20 % Rationing Level

• Observation: At a 20% rationing goal, mandatory rationing occurs 80% more frequently than at a 10% rationing goal.

Rationing Goal	Years of Voluntary Rationing During the Planning Period	Years of Mandatory Rationing During the Planning Period
10%	2.6	**1.5**
15%	2.8	**2.0**
20%	2.5	**2.7**

Planning Period = 2010-2040

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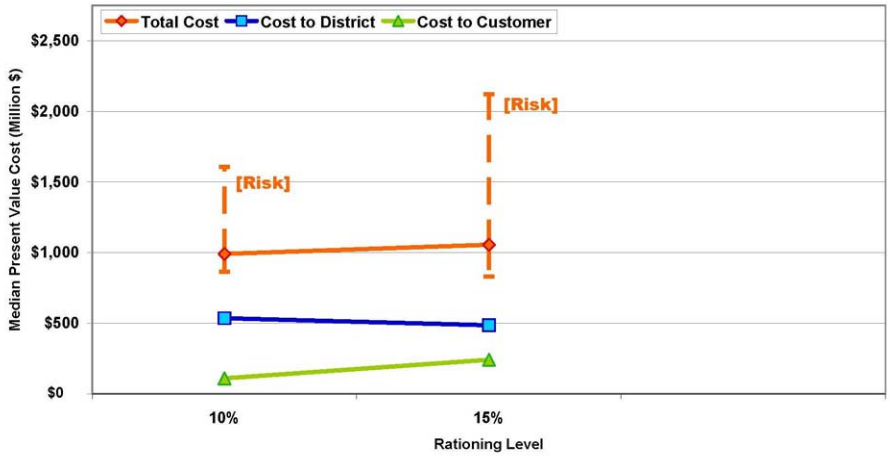
Water Supply Management Program 2040

Rationing Level



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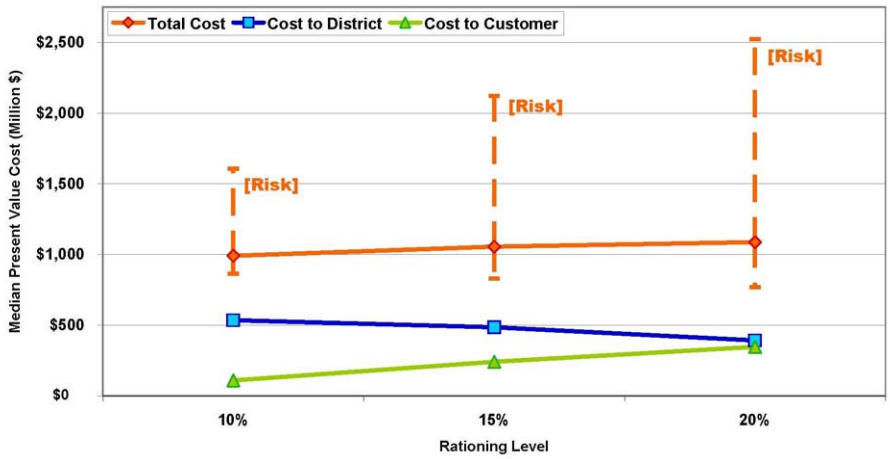
Water Supply Management Program 2040

Rationing Level



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Water Supply Management Program 2040

Conservation Level

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Water Supply Management Program 2040

Conservation Level

Conservation Level	**C** (37 MGD)	**D** (39 MGD)
Measures	▪ Surveys ▪ Toilet rebates ▪ Leak detection ▪ Irrigation incentives	▪ Required plumbing for future graywater use in residential ▪ Extensive incentives/rebates for irrigation upgrades
# Measures	51	53
Total Cost (NPV)*	$284 M	$404 M
Rate Increase from Level C to D (%)		2.8

* Includes lost revenue.

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Water Supply Management Program 2040

Recycling Level

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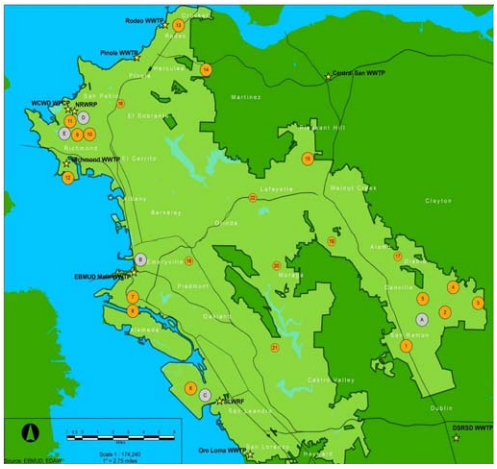
Water Supply Management Program 2040

Recycling Level



Recycling Level	2	3
MGD	5	11
Total Cost (NPV)*	$97 M	$277 M
Rate Increase (%)	2.2	6.4
Rate Difference (%)	-	4.2

* Includes lost revenue of $92M for CoP & RARE expansion.

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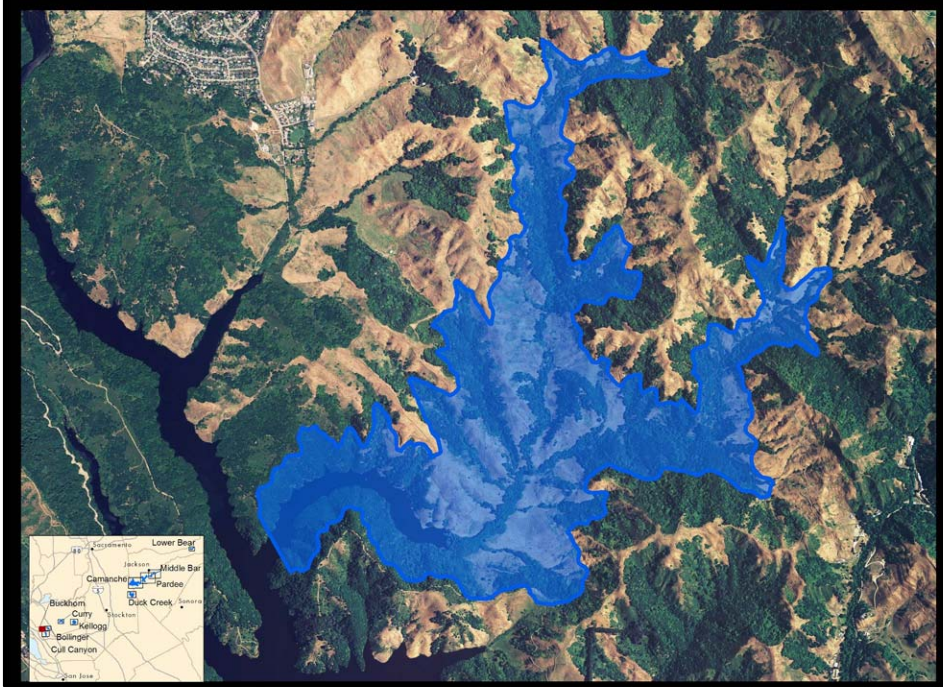
EBMUD Water Supply Management Program 2040

Supplemental Supply

Buckhorn Reservoir (143 TAF)



Water Supply Management Program 2040

Buckhorn Reservoir Pros & Cons

Pros

- West of Delta storage
- High operational flexibility
- High water quality of Mokelumne River
- EBMUD land
- High elevation - Gravity flow
- No displacement of residences or land use
- Relatively remote
- Lowest cost to District of the 5 portfolios

Cons

- Inundates approximately 7 miles of stream
- Alters 40 acres of wetlands
- Inundates known habitat for Alameda whipsnake & sensitive fish species
- Traffic, noise, and air quality construction-related short-term impacts
- Controversial history

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Water Supply Management Program 2040

Ancillary Facility Construction

- All portfolios except Portfolio C require upcountry pretreatment of non-Mokelumne water
- Regional Desalination partners would need to fund high-cost transmission/distribution improvements to obtain peak summer deliveries
- Water from a Regional Desalination component would be treated a second time at EBMUD treatment plants due to transmission system configuration

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EBMUD Water Supply Management Program 2040

--- Break ---

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EBMUD Water Supply Management Program 2040

Recommended Approach to
Preferred Portfolio

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EBMUD Water Supply Management Program 2040

Preferred Portfolio

- Uncertainty about the future (e.g., GCC) suggests need for a **robust plan**
- We need to pursue **multiple, parallel** Project Components
- We need **diversity & flexibility** in our strategy

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Water Supply Management Program 2040

Board of Directors' Workshop #10

September 23, 2008

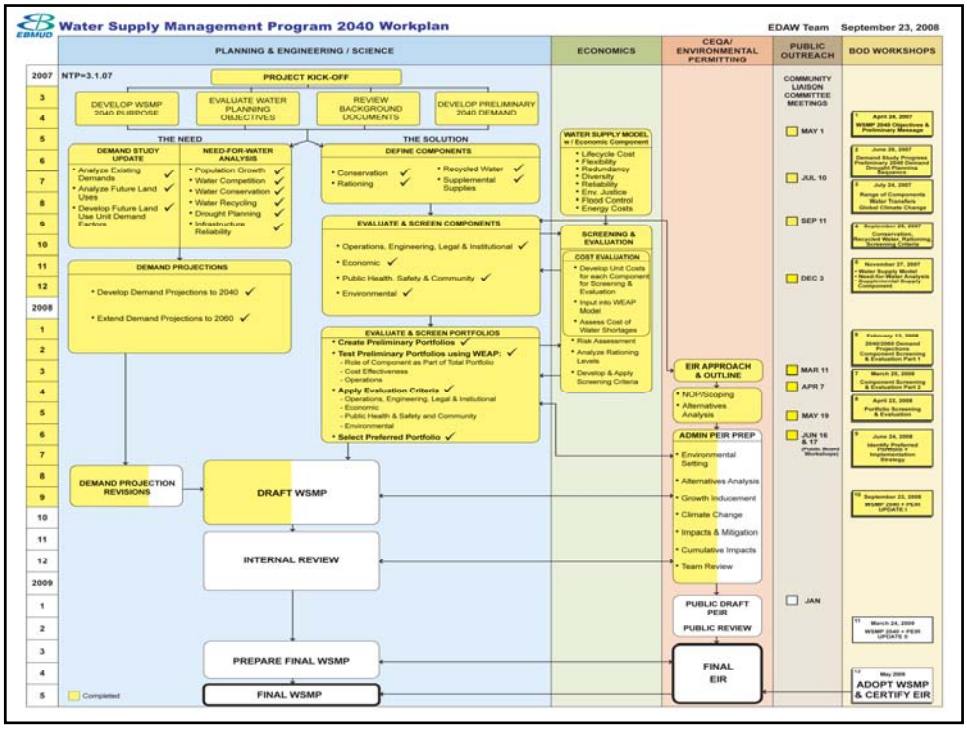
1

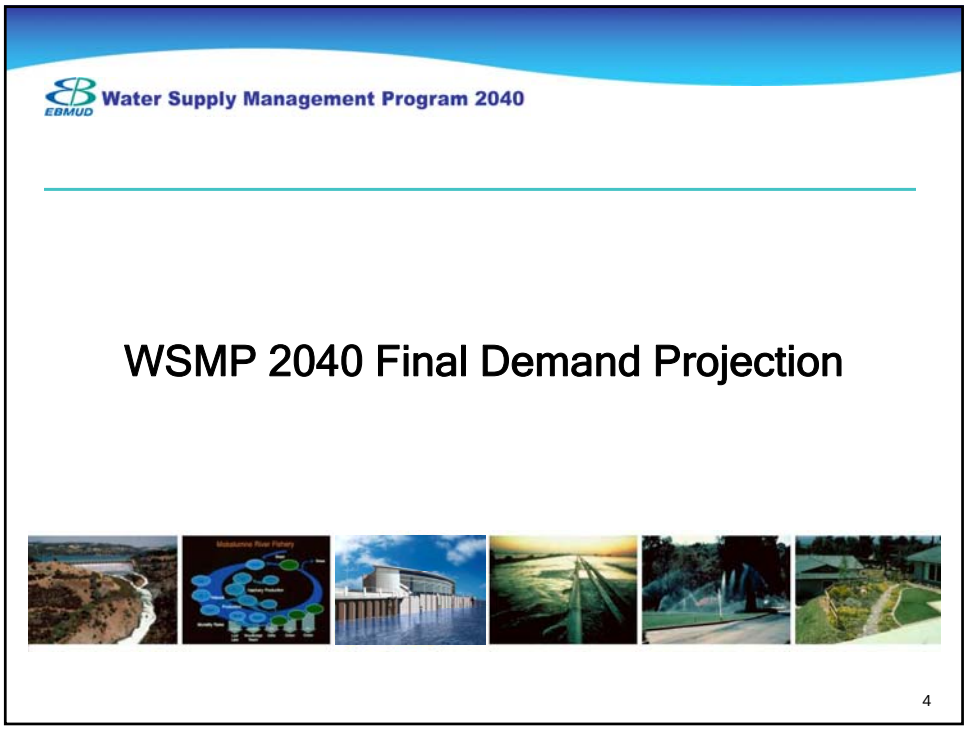
Water Supply Management Program 2040

Agenda

1. Workshop Purpose
2. WSMP 2040 Update
   - Workplan and Schedule
   - Final Demand Projection
   - Preferred Portfolio
   - WSMP 2040 Plan Status
   - NOP Scoping Comments
   - WSMP Program EIR Status
3. Update on Existing & Ongoing District Programs
4. Next Steps

2


Water Supply Management Program 2040 Workplan
EDAW Team
September 23, 2008
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
NTP=3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP PRELIMINARY 2040 DEMAND
THE NEED
THE SOLUTION
DEMAND STUDY UPDATE
NEED-FOR-WATER ANALYSIS
DEFINE COMPONENTS
Conservation
Rationing
Recycled Water
Supplemental Supplies
EVALUATE & SCREEN COMPONENTS
Operations, Engineering, Legal & Institutional
Economic
Public Health, Safety & Community
Environmental
DEMAND PROJECTIONS
Develop Demand Projections to 2040
Extend Demand Projections to 2060
EVALUATE & SCREEN PORTFOLIOS
Create Preliminary Portfolios
Test Preliminary Portfolios using WEAP:
Role of Component as Part of Total Portfolio
Cost Effectiveness
Operations
Apply Evaluation Criteria
Operations, Engineering, Legal & Institutional
Economic
Public Health & Safety and Community
Environmental
Select Preferred Portfolio
DEMAND PROJECTION REVISIONS
DRAFT WSMP
INTERNAL REVIEW
PREPARE FINAL WSMP
FINAL WSMP
WATER SUPPLY MODEL w / Economic Component
Lifecycle Cost
Flexibility
Redundancy
Diversity
Reliability
Env. Justice
Flood Control
Energy Costs
SCREENING & EVALUATION
COST EVALUATION
Develop Unit Costs for each Component for Screening & Evaluation
Input into WEAP Model
Assess Cost of Water Shortages
Risk Assessment
Analyze Rationing Levels
Develop & Apply Screening Criteria
EIR APPROACH & OUTLINE
NOP/Scoping
Alternatives Analysis
ADMIN PEIR PREP
Environmental Setting
Alternatives Analysis
Growth Inducement
Climate Change
Impacts & Mitigation
Cumulative Impacts
Team Review
PUBLIC DRAFT PEIR
PUBLIC REVIEW
FINAL EIR
COMMUNITY LIAISON COMMITTEE MEETINGS
MAY 1
JUL 10
SEP 11
DEC 3
MAR 11
APR 7
MAY 19
JUN 16 & 17
JAN
ADOPT WSMP & CERTIFY EIR
Completed


Water Supply Management Program 2040
WSMP 2040 Final Demand Projection
4

Water Supply Management Program 2040

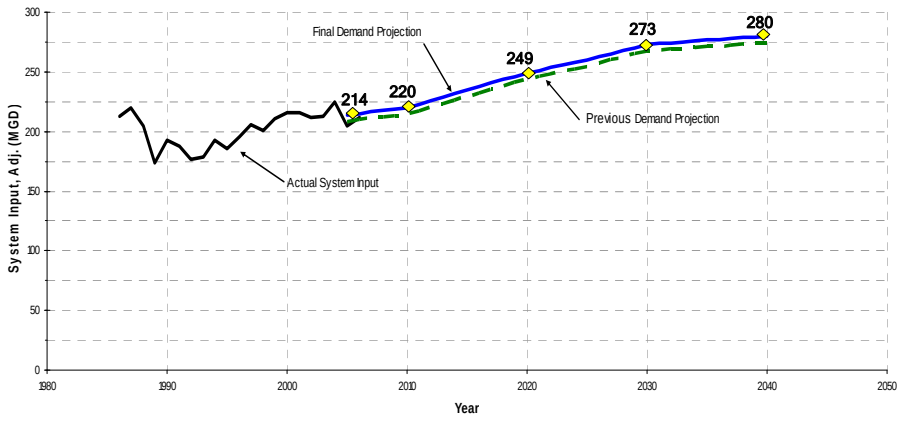
Final Demand Projection

- Existing recycled water use was double counted, giving appearance of lower water demand.
- Before the revision, the unadjusted 2040 gross demand projection was 306 million gallons per day (MGD).
- The revision increases gross demand by 6 MGD:
  306 MGD + 6 MGD = 312 MGD
- Final Demand Projection:
  312 MGD – 23 MGD (current conservation) – 9 MGD (current recycled water & RARE) = 280 MGD
- Need-for-water calculation is undergoing revision; will likely increase by 20 – 25 TAF.
- Preferred portfolio has flexibility to meet increased need for water.

5

Water Supply Management Program 2040

Final Demand Projection



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Water Supply Management Program 2040

Review Preferred Portfolio

7

Water Supply Management Program 2040

Preferred Portfolio

- Robust plan: needed in light of future uncertainty (e.g., Global Climate Change)
- Multiple, parallel project components
- Diverse & flexible strategy
- Environmentally sound

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Water Supply Management Program 2040

Board Guidance Provided for Preferred Portfolio

(Workshop #9: June 24, 2008)

▪ Rationing Level	10%
▪ Conservation Level (Level D)	39 MGD
▪ Recycling Level (Level 3)	11 MGD
▪ Buckhorn Reservoir	Not in Preferred Portfolio

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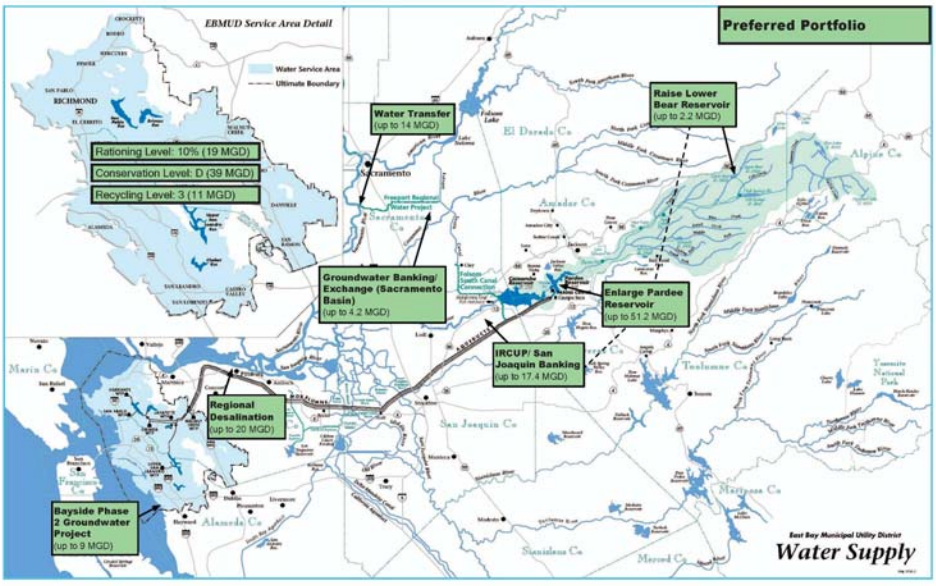

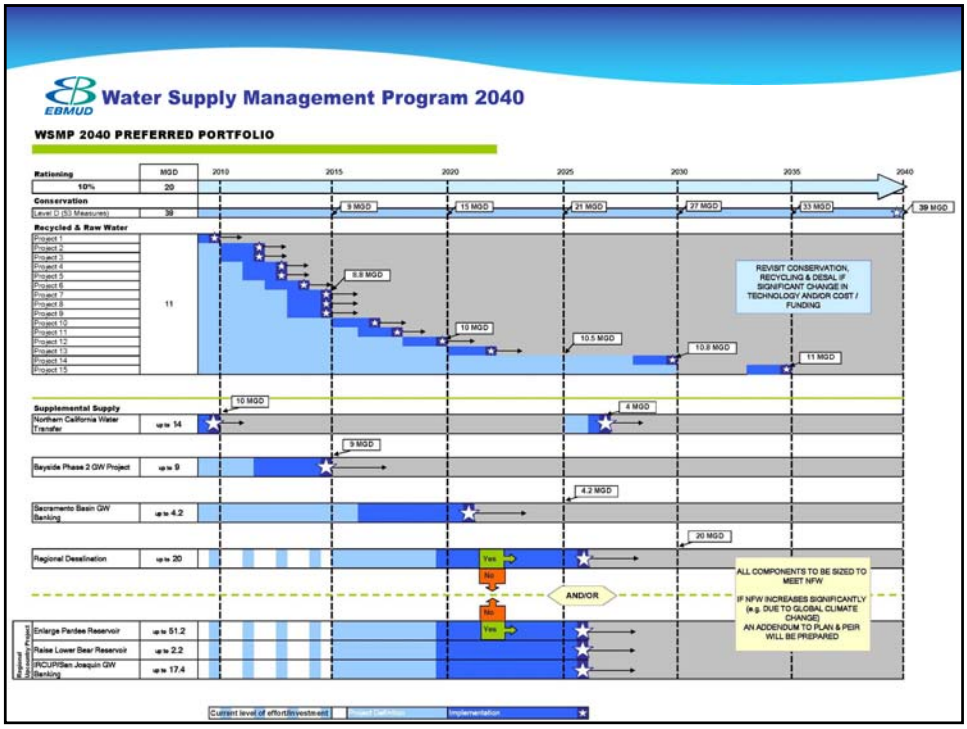
Water Supply Management Program 2040
WSMP 2040 PREFERRED PORTFOLIO
Rationing
MGD
10%
20
Conservation
Level D (53 Measures)
39
Recycled & Raw Water
11
Supplemental Supply
Northern California Water Transfer
up to 14
Bayside Phase 2 GW Project
up to 9
Sacramento Basin GW Banking
up to 4.2
Regional Desalination
up to 20
Enlarge Pardee Reservoir
up to 51.2
Raise Lower Bear Reservoir
up to 2.2
IRCUP/San Joaquin GW Banking
up to 17.4
2010
2015
2020
2025
2030
2035
2040
9 MGD
15 MGD
21 MGD
27 MGD
33 MGD
39 MGD
8.8 MGD
10 MGD
10.5 MGD
10.8 MGD
11 MGD
10 MGD
4 MGD
9 MGD
4.2 MGD
20 MGD
Yes
No
AND/OR
REVISIT CONSERVATION, RECYCLING & DESAL IF SIGNIFICANT CHANGE IN TECHNOLOGY AND/OR COST / FUNDING
ALL COMPONENTS TO BE SIZED TO MEET NFW
IF NFW INCREASES SIGNIFICANTLY (e.g. DUE TO GLOBAL CLIMATE CHANGE) AN ADDENDUM TO PLAN & PEIR WILL BE PREPARED
Current level of effort/investment
Implementation


Water Supply Management Program 2040
WSMP 2040 Plan
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Water Supply Management Program 2040

WSMP 2040 Plan - Key Messages

1. Rigorous methodology for demand projection & need-for-water calculations.
2. Future demand primarily due to infill development & densification.
3. Conservation & Recycling are pushed to edge of cost-effectiveness.
4. 10% Rationing allows flexibility in face of future uncertainty.
5. Environmental benefits considered throughout.
6. Above & below-ground storage solutions increase reliability.
7. Regional partnerships essential for success.
8. Active & participatory public outreach process.

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Water Supply Management Program 2040

WSMP 2040 Program EIR

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Water Supply Management Program 2040

Summary of NOP Scoping Comments

- Number received = 15 letters, 3 emails, 4 verbal
- Comments were received in the following categories:
  - Water Supply / Water Quality
  - Demand Projection Methodology
  - Groundwater Considerations
  - Biological Impacts
  - Land Use & Transportation Impacts
  - Cultural Resources Impacts
  - Recreation Impacts
  - Cumulative Impacts

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Water Supply Management Program 2040

Select NOP Scoping Comments

Water Supply / Water Quality

- Support Lower Bear Reservoir, Pardee Reservoir and IRCUP
- No impacts on Delta water quality/reliability from transfers
- Wastewater effluent as a potential potable water source
- Will enlarge Pardee component include regional partners?
- Preferred portfolio components should reduce Mokelumne demand

Demand Projection Methodology

- Compare methodology/differences between WSMP 2040 and UWMP
- Justify use of a limited historical hydrologic period

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Water Supply Management Program 2040

Select NOP Scoping Comments (Cont'd)

Groundwater Considerations

- ID effects upon Sac. Water Forum Agreements on basin recharge & recovery
- Discuss degradation of groundwater from ASR components
- Feasibility/water yield conclusions for Bayside Phase 2 are premature
- Include ESJ Integrated Conjunctive Use Program as components

Biological Impacts

- Impacts on endangered species from transfers
- Loss of forest habitat from Lower Bear component
- Impacts to aquatic resources from reservoir expansion

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Water Supply Management Program 2040

Select NOP Scoping Comments (Cont'd)

Cultural Resources Impacts

- Historic/cultural resource losses from expanded reservoir components

Recreation Impacts

- Trails/recreation impacts in East Bay watershed from WSMP components
- Loss of river recreation and associated economic impacts

Cumulative Impacts

- GHG analysis for reservoir components must be life-cycle-based
- Describe GHG cumulative effects on climate change

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Water Supply Management Program 2040

WSMP Program EIR Status

Overall Approach

- Focus on Preferred Portfolio
- Program level analysis

Alternatives

- Five alternative portfolios + Preferred Portfolio + No Action Alternative.
- Preferred Portfolio is a blend of what we learned from the analysis of the five portfolios.

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Water Supply Management Program 2040

WSMP Program EIR Status

Potentially Significant Impacts

- Due to lack of detail at program level, some impacts will have to be called “potentially significant”

Environmentally Superior Alternative

- CEQA asks that the proponent identify the environmentally superior alternative. However, the proponent is not obligated to select this alternative as their preferred
- We will use our environmental screening criteria to identify superior aspects of select portfolios

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Water Supply Management Program 2040

Portfolio Number	Portfolio	Portfolio Theme	Operations, Engineering, Legal & Institutional				Economic		Public Health, Safety & Community		Environmental		Portfolio
			• Minimize the vulnerability & risk of disruptions (i.e., **reliability**).	• Maximize the system's **operational flexibility**.	• Minimize **institutional & legal complexities** & barriers.	• Maximize **partnerships** & regional solutions.	• Minimize the financial **cost** to the **District** of meeting customer demands for given level of system reliability.	• Minimize **customer** water shortage **costs**.	• Minimize potential adverse impacts to the **public health** of District customers. • Maximize use of water from the **best** available **source**.	• Minimize long-term adverse **community impacts**. • Minimize adverse **social effects**. • Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	• Minimize adverse **impacts** on the **environment**. • Minimize construction & operation effects on environmentally **sensitive resources**.	• Minimize short term & long term **greenhouse gas emissions** from construction. • Maximize **energy efficiency** associated with operations & maintenance. • Maximize contributions to **AB 32 goals**.	
4	A	Groundwater	L	H	L	H	L	H	M	M	H	M	A
8	B	Diversified	H	M	L	H	M	H	L	M	M	L	B
8	C	Reliability	H+	H+	M	L	H	L	M	L	L	M	C
10	D	Lower Carbon Footprint	L	H	M	M	M	M	H+	M	M	H	D
12	E	Recycling & Transfer	L	H	L	H	L	H	M	M	H	M	E

H = High Response to Evaluation Criteria; L = Low Response to Evaluation Criteria

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Water Supply Management Program 2040

WSMP Program EIR Status

Global Climate Change

- Qualitative analysis of Preferred Portfolio's effect on global climate change associated with generation of greenhouse gas emissions
- Effects of climate change on EBMUD's water supply (e.g., potential reduction and/or change in snowpack & runoff; potential increase in summer demands)
- Greenhouse gas emissions not quantified at this stage as construction & operation details not known

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Water Supply Management Program 2040

Update on Existing & Ongoing District Programs

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Water Supply Management Program 2040

Water Conservation Program Update

- Provided approximately $1.5M in water conservation incentives in 2008
  - 4,525 high-efficiency toilets
  - 6,912 high-efficiency clotheswashers
  - 473 weather-based irrigation controllers
  - 12,635 devices (showerheads, aerators, irrigation equipment, etc.)
- Installed acoustic devices in Berkeley to identify pipe leakage
- Launched the WaterSmart Garden Grant Program (4 projects awarded)

- **23 MGD savings 1995-2008**
- **Additional 39 MGD planned through 2040**

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Water Supply Management Program 2040

Recycled Water Program Update

- East Bayshore Phase 1
  - Under construction
- RARE Water Project
  - On-line by 2010
  - Will initially produce 3.5 MGD
- DSRSD/EBMUD Recycled Water Authority (DERWA) Phase 2
  - Will be completed by 2009
  - Phase 2 distribution system expansion by 2010 (0.75 MGD)

- 9.5 MGD through 2010 (current production plus RARE)
- Additional 11 MGD planned through 2040 (including DERWA Ph. 2)

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Water Supply Management Program 2040

Supplemental Supply Program Update

- Freeport Regional Water Project
  - Construction completion scheduled by end of 2009
  - Will provide a 165 TAF supply over a 3-yr drought cycle
- Bayside Groundwater Project – Phase 1
  - Construction completion scheduled for late summer 2009
  - Will provide a 1 mgd supply in times of drought
  - Phase 2 expansion studies (Phase 2 = extra 9 mgd) to begin in 2011
- Regional Desalination Project
  - Pilot test underway in East Contra Costa County
  - Piloting to be completed by end of 2009

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Water Supply Management Program 2040

Supplemental Supply Program Update

- **Water Transfer Opportunities**
  - Negotiated transfer of 6 TAF with Woodbridge Irrigation District
  - Meeting with Bay Area, Mokelumne Area, and Sacramento Valley Agencies to identify transfer and exchange opportunities
- **Sacramento County Groundwater Opportunities**
  - Meeting with SCWA to develop concepts, understand basin
- **Upcountry Partnerships**
  - Partnering with AWA on Raise Lower Bear feasibility study
  - Working with the Mokelumne River Forum members on IRCUP+ concept (regional water storage)

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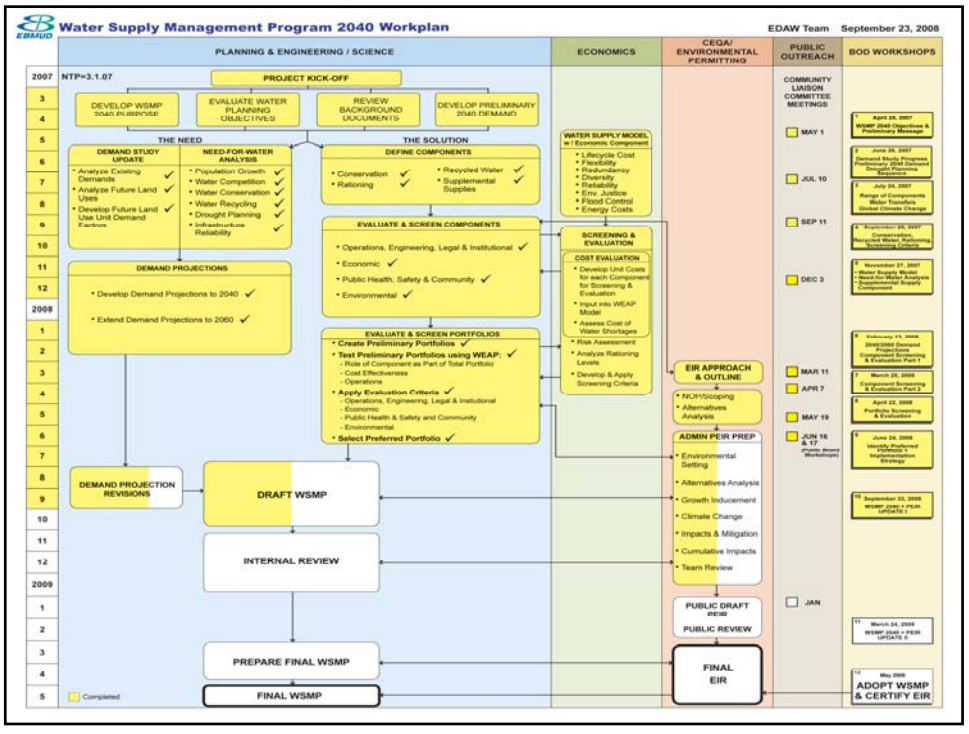

Water Supply Management Program 2040

Next Steps

Publish Draft PEIR	January 7, 2009
Public Comment Period	January 8 – February 23, 2009
CLC Meeting #9	January 2009
Board Workshop #11	March 24, 2009
Circulate Final PEIR	May 4 – 13, 2009
Adopt WSMP 2040 & Certify Final PEIR	May 28, 2009

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Water Supply Management Program 2040

Board of Directors' Workshop #11

February 24, 2009

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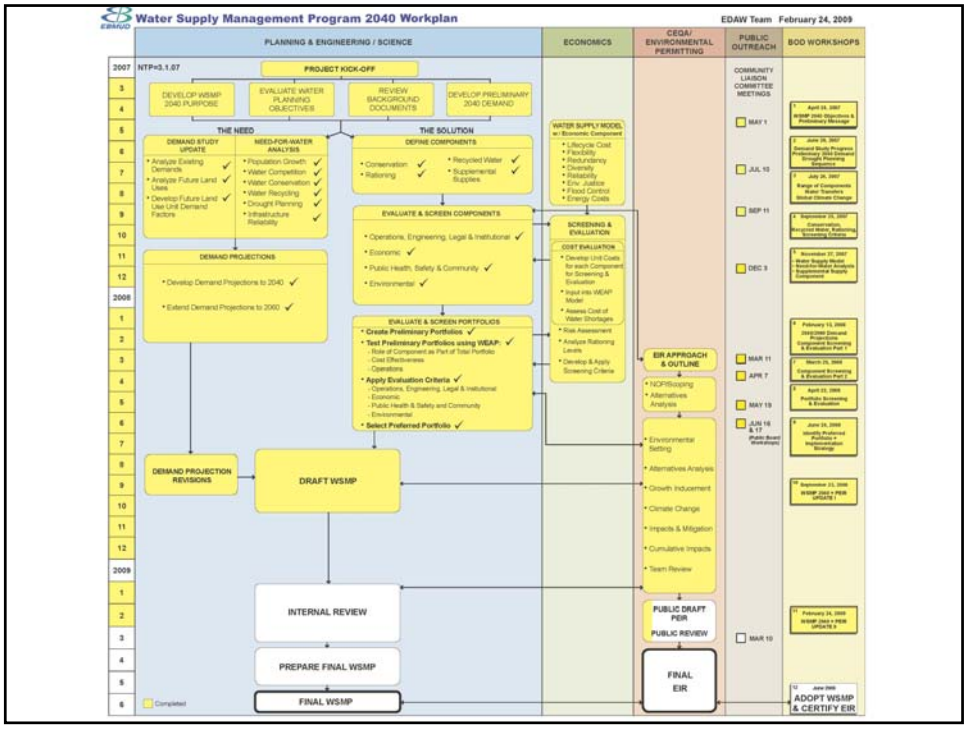
Water Supply Management Program 2040

Agenda

1. EIR Status
2. Preferred Portfolio
3. EIR Analysis & Findings
4. Next Steps

2



Water Supply Management Program 2040

EIR Status

- File Draft PEIR with State Clearinghouse: Feb 19
- CLC Meeting #8: March 10
- Public Meetings
  - Lodi: March 16
  - Sutter Creek: March 16
  - Oakland: March 18
  - Walnut Creek: March 23
- Comment Period Closes: April 6
- Final EIR Target Dates:
  - Ready to Print: June 1
  - File with State Clearinghouse: June 12
  - Board Meeting, Public Comment, & Certification: June 23

4

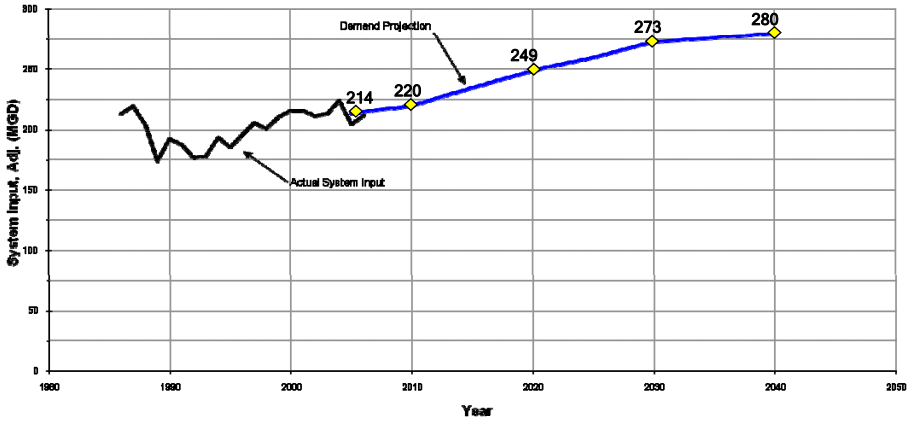
Water Supply Management Program 2040

Preferred Portfolio

5

Water Supply Management Program 2040

Demand Projection



6

Water Supply Management Program 2040

Board Guidance Provided for Preferred Portfolio

- Rationing Level — 10%
- Conservation Level (Level D) — 39 MGD
- Recycling Level (Level 3) — 11 MGD
- Buckhorn Reservoir — Not in Preferred Portfolio
- Include all other components:
  Northern California Water Transfers, Bayside Groundwater Project Phase 2, Sacramento Basin Groundwater Banking / Exchange, Regional Desalination, Enlarge Lower Bear Reservoir, Enlarge Pardee Reservoir, Mokelumne Inter-Regional Conjunctive Use Project (IRCUP) / San Joaquin Groundwater Banking / Exchange
- Preferred Portfolio Designated for Purposes of Program EIR & Plan

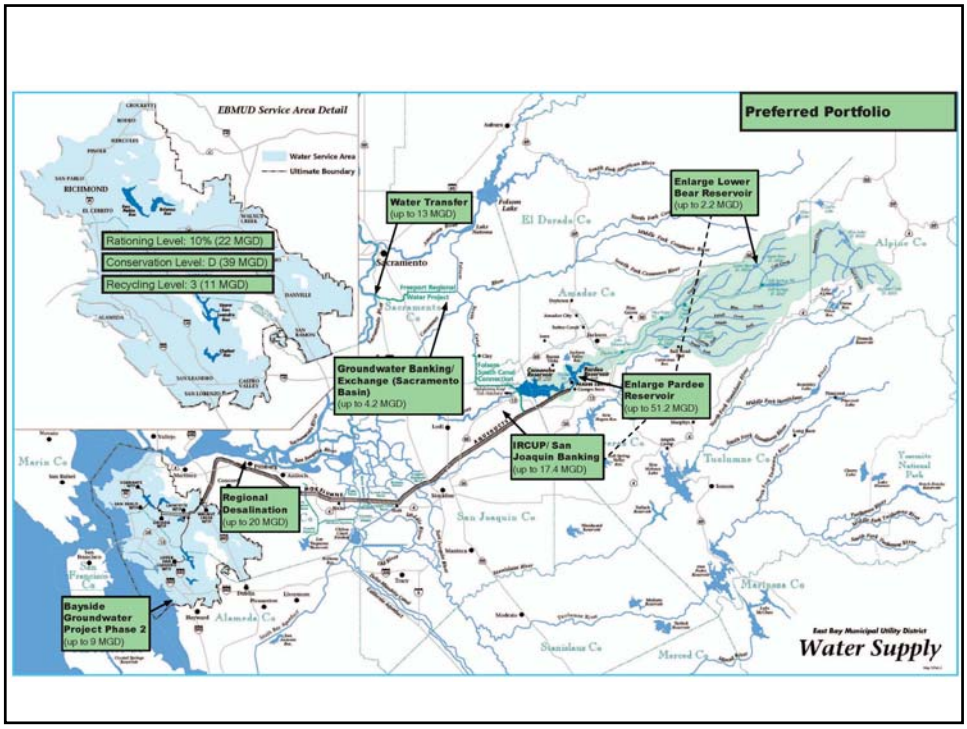
7

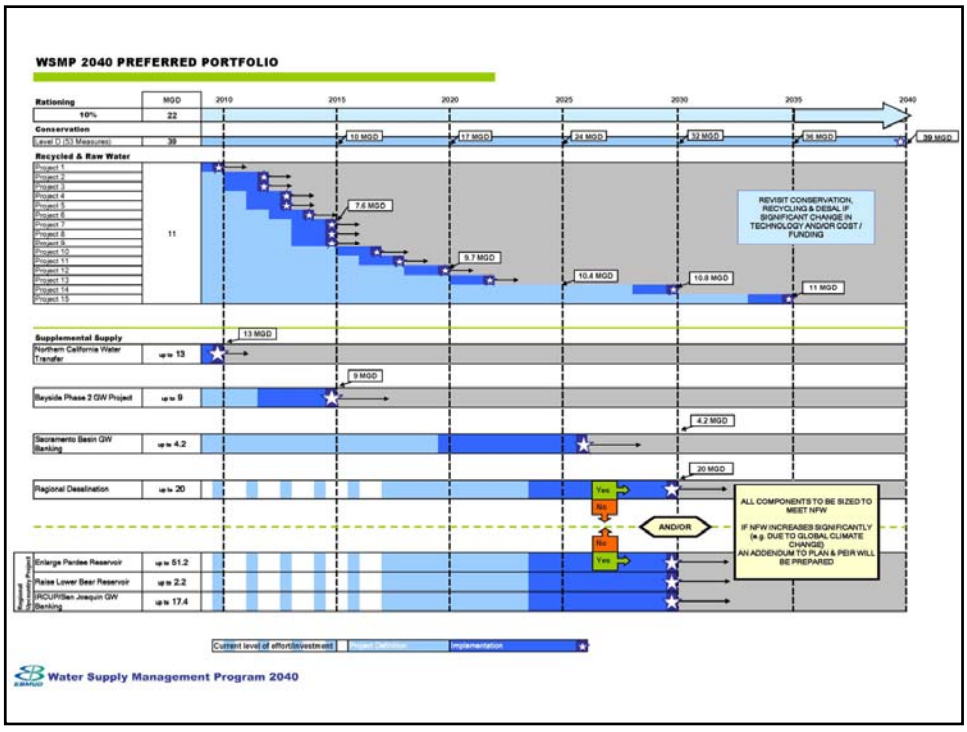
Water Supply Management Program 2040

Preferred Portfolio

- Robust plan: needed in light of future uncertainty (e.g., Global Climate Change)
- Multiple, parallel project components
- Diverse & flexible strategy
- Environmentally sound

8


EBMUD Service Area Detail
Preferred Portfolio
Water Service Area
Ultimate Boundary
Rationing Level: 10% (22 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 3 (11 MGD)
Water Transfer (up to 13 MGD)
Enlarge Lower Bear Reservoir (up to 2.2 MGD)
Groundwater Banking/ Exchange (Sacramento Basin) (up to 4.2 MGD)
Enlarge Pardee Reservoir (up to 51.2 MGD)
IRCUP/ San Joaquin Banking (up to 17.4 MGD)
Regional Desalination (up to 20 MGD)
Bayside Groundwater Project Phase 2 (up to 9 MGD)
Sacramento
El Dorado Co
Amador Co
Alpine Co
Marin Co
San Joaquin Co
Tuolumne Co
Mariposa Co
Stanislaus Co
Merced Co
Alameda Co
East Bay Municipal Utility District
Water Supply


WSMP 2040 PREFERRED PORTFOLIO
Rationing
MGD
10%
22
Conservation
Level D (5) Measures
39
2010
2015
2020
2025
2030
2035
2040
10 MGD
17 MGD
24 MGD
32 MGD
36 MGD
39 MGD
Recycled & Raw Water
11
7.6 MGD
9.7 MGD
10.4 MGD
10.8 MGD
11 MGD
REVISIT CONSERVATION, RECYCLING & DESAL IF SIGNIFICANT CHANGE IN TECHNOLOGY AND/OR COST / FUNDING
Supplemental Supply
Northern California Water Transfer
up to 13
13 MGD
Bayside Phase 2 GW Project
up to 9
9 MGD
Sacramento Basin GW Banking
up to 4.2
4.2 MGD
Regional Desalination
up to 20
20 MGD
Yes
No
AND/OR
ALL COMPONENTS TO BE SIZED TO MEET NFW
IF NFW INCREASES SIGNIFICANTLY (e.g. DUE TO GLOBAL CLIMATE CHANGE) AN ADDENDUM TO PLAN & PEIR WILL BE PREPARED
Enlarge Pardee Reservoir
up to 51.2
Raise Lower Bear Reservoir
up to 2.2
IRCUP/San Joaquin GW Banking
up to 17.4
Current level of effort/investment
Project Definition
Implementation
Water Supply Management Program 2040

Water Supply Management Program 2040

WSMP 2040 Plan - Key Messages

1. Rigorous methodology for demand projection & need-for-water calculations.
2. Future demand primarily due to infill development & densification.
3. Conservation & Recycling are pushed to edge of cost-effectiveness.
4. 10% Rationing allows flexibility in face of future uncertainty.
5. Environmental benefits considered throughout.
6. Above & below-ground storage solutions increase reliability.
7. Regional partnerships essential for success.
8. Active & participatory public outreach process.

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Water Supply Management Program 2040

EIR Analysis & Results

12

Water Supply Management Program 2040

Program EIR: Accomplishments

1. Established Purpose & Need for WSMP; enables tiering & focused project-level analysis.
2. All Preferred Portfolio components merit further study. Planning, engineering design, environmental documentation & implementation planning can proceed.
3. Setting & potential impacts have been characterized for all components.
4. Robust set of components & need for future flexibility maintained.
5. Foundation for maintaining & defending water rights established.

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Preferred Portfolio & Alternatives

PORTFOLIO DESIGNATION	PORTFOLIO THEMES / EMPHASIS	PORTFOLIO DESCRIPTION	COMPONENTS													
			Rationing		Conservation		Recycled Water		Supplemental Supply							
			10%	15%	Current Program Equivalent (C)	Current Program Equivalent +2 (D)	Recycled Water Level 2	Recycled Water Level 3	Northern California Water Transfers	Bayside Groundwater Project Phase 2	Sacramento Basin Groundwater Banking/Exchange [a]	Regional Desalination	Enlarge Pardee Reservoir	Enlarge Lower Bear Reservoir	IRCUP/San Joaquin Groundwater Banking/Exchange [b]	Buckhorn Canyon Reservoir
			22 MGD	32 MGD	UP TO 37 MGD	UP TO 39 MGD	UP TO 6 MGD	UP TO 11 MGD	UP TO 4.5-28.5 MGD	UP TO 9 MGD	UP TO 4.2 MGD	UP TO 20 MGD	UP TO 51.2 MGD	UP TO 2.2 MGD	UP TO 17.4 MGD	UP TO 42 MGD
Preferred Portfolio		Maximum Flexibility	•			•		•	•	•	•	•	•	•	•	
A	Groundwater/ Conjunctive Use & Water Transfers	Groundwater storage / recharge in multiple locations	•			•	•		•	•	•				•	
B	Regional Partnerships	All partnership projects & conservation	•		•		•		•		•	•		•	•	
C	Local System Reliance	West of delta surface storage		•	•		•									•
D	Lower Carbon Footprint	Pardee Reservoir enlargement & conservation		•	•		•						•			
E	Recycled Water & Water Transfers	Highest recycled water level	•		•			•	•	•	•					

Notes: [a] Sacramento Basin Groundwater Banking/Exchange component must be coupled with a transfer water component.
[b] IRCUP includes San Joaquin Basin Groundwater Banking/Exchange.

Water Supply Management Program 2040

Program EIR: Impact Types

- Potentially Significant
- Less than Significant
- Beneficial

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Water Supply Management Program 2040

Program EIR: Potentially Significant Impacts

- Some impacts are potentially significant and would need further analysis in Project-level EIRs
- This is common in a Program-level analysis where project details are unknown.

Examples

- **Air Quality & Noise** impacts may be potentially significant, but will not be determined until facilities have been sized and sited, and operation plans are formulated.
- Reduced **Agricultural Productivity** due to water transfers (e.g., timing, water quantity & fallowed acres still to be determined).
- **Hydrologic impacts** due to regional (IRCUP and Sac Co) groundwater banking projects may be potentially significant. Impacts and appropriate mitigation cannot be determined until diversion locations, volumes, and timing are confirmed.

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Water Supply Management Program 2040

Program EIR: Less than Significant Impacts

- Many of the potential impacts are less than significant using customary mitigation practices.

Examples

- Any construction-related impacts to **Water Quality** would comply with State NPDES general construction permit.
- Potential impacts to **Biological Resources** (e.g., wetlands, plant & animal species) would be minimized by surveys, permits & identification of appropriate mitigation plans.
- Potential impacts to **Recreation Resources** at Pardee & Lower Bear would be mitigated by replacement of recreation features or changes in operation to preserve Electra whitewater run during the summer.
- Potential Impacts to **Cultural Resources** mitigated by record searches, plans to manage discovery of any as-yet unknown resources on site.

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Water Supply Management Program 2040

Program EIR: Beneficial Impacts

- Water quality improved for Raise Pardee Reservoir & Raise Lower Bear components.
- No expected waste discharges from reservoir enlargement.
- Larger pools of cold water would contribute to cooler water downstream in summer & autumn.

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Water Supply Management Program 2040

Program EIR: Growth Inducement
(required CEQA analysis & chapter)

- Less than significant
- Emphasis is on dry-year supply
- Not intended to support unplanned growth
- Supply solution matched to demand curve out to 2040 as best as possible.

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Water Supply Management Program 2040

Program EIR: Climate Change

- Less than significant (GCC on WSMP & WSMP on GCC)
- Sensitivity analysis was conducted to predict how EBMUD's system would respond to varying climate conditions.
- Additional storage + source diversity + 10% low rationing goal of the Preferred Portfolio provide maximum flexibility to adapt to unknown future conditions.

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Water Supply Management Program 2040

Program EIR: Cumulative Impacts

- Cumulative impact: the combined effect of the WSMP impacts **plus** impacts of other past, present, & reasonably foreseeable future projects. Examples:
  - Bay Delta Conservation Plan.
  - FERC Projects (i.e., PG&E's Lower Bear Pumped Storage).
  - Misc. City & County Development Projects.
- Potentially significant cumulative impacts: incremental impacts of WSMP are cumulatively considerable / significant when viewed in connection with other related projects.
  - Potential impacts to downstream users.
  - Potential reduction of agricultural productivity.
  - Potential to violate air quality standards.
  - Potential exposure to excessive noise.

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Water Supply Management Program 2040

Next Steps

File Draft PEIR with State Clearinghouse: Feb 19

- CLC Meeting #8: March 10
- Public Meetings: March 16, 18, & 23
- Comment Period Closes: April 6
- Final WSMP Plan Document Complete: May 8
- Final EIR Board Meeting, Public Comment, & Certification: June 23
- After PEIR Certification:
  - Update Relevant Policies & Procedures
  - Incorporate Drought Declaration Changes
  - Update Conservation & Recycled Water Master Plans
  - Update Urban Water Management Plan (2010)

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EAST BAY MUNICIPAL UTILITY DISTRICT

WSMP 2040 Board Workshop
Revisions to the PEIR

September 27, 2011

Presentation Summary

EBMUD

1. WSMP 2040 Background/Refresher - *15 min*
2. CEQA Challenge - *10 min*
3. Notice of Preparation (NOP) Scoping Report - *5 min*
4. Revision Effort (Enlarge Pardee Reservoir) - *20 min*
5. Revision Effort (Enlarge Los Vaqueros Participation) - *15 min*
6. Break - *10 min*
7. Portfolio Analysis/Next Steps - *25 min*
8. Public Comments - *30 min*
9. Board Comments - *20 min*

2

Background / Refresher

3

Background: Original WSMP 2040 Purpose

1. Planed for water supply reliability to the year 2040
2. Accounted for accomplishments & changes since the last WSMP (1993), including:
   - Freeport completion;
   - Conservation and recycling programs;
   - Lower Mokelumne Joint Settlement Agreement;
   - New regulations; and
   - Global climate change.
3. Established optimum balance between rationing, conservation, recycling & supplemental supply.

4

Background: WSMP 2040 Planning Objectives

- Operations, Engineering, Legal & Institutional
  - Provide water supply reliability
  - Rely upon current water right entitlements
  - Promote District involvement in regional solutions
- Economic
  - Minimize cost to District customers
  - Minimize drought impact to District customers
  - Maximize positive impact to local economy
- Public Health, Safety & Community
  - Ensure the high quality of the District's water supply
  - Minimize adverse sociocultural impacts (including environmental justice)
  - Minimize risks to public health & safety
  - Maximize security of infrastructure & water supply
- Environmental
  - Preserve & protect the environment for future generations
  - Preserve & protect biological resources
  - Minimize carbon footprint
  - Promote recreational opportunities

5

Desired WSMP 2040 Features

- **A robust plan**: needed in light of future uncertainty (e.g., global climate change)
- **Multiple, parallel** project components
- **A diverse and flexible** strategy
- **Environmentally** sound

6

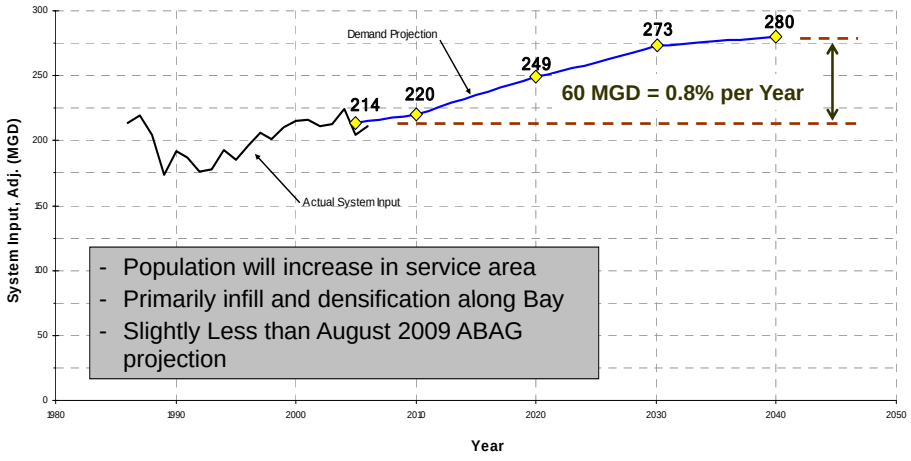
WSMP 2040: Public Outreach Performed

- 11 EBMUD Board Workshops
- 8 meetings with the Community Liaison Committee
- Meetings with regional forums

  (Mokelumne River Forum, NE San Joaquin GBA, Upper Mokelumne WRA)
- Numerous public workshops
- Draft Environmental Impact Report
  - 5 public meetings
  - 75-day public comment period
- Website (continually updated)

7

Consideration: Water Demand Projection



8

UWMP 2010 - Demands

Portfolio Development Process

- Develop a portfolio by selecting from the following:
  - Conservation Options
    - Levels A, B, C, D, or E
  - Recycling Options
    - 0, 5 or 11 mgd
  - Rationing Options
    - 0%, 10%, 15%, 20%, or 25%
  - Supplemental Supply Options
    - Desalination
    - Groundwater banking
    - Water transfers
    - Off stream storage reservoirs
    - Expansion of existing reservoirs
    - Other (water bags, fog capture, etc.)

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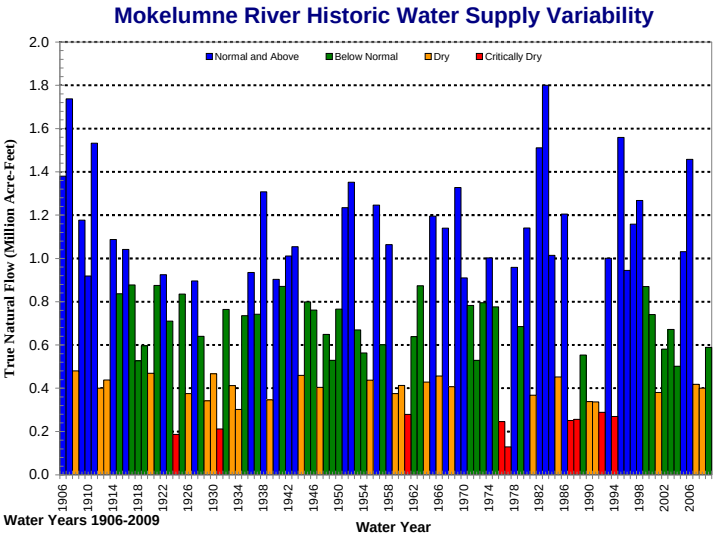
Uncertainty Consideration: Mokelumne Basin Runoff



11

Enlarge Pardee Considerations

Pardee Enlargement Option (assuming new embankment downstream of existing)	Normal Pool Elevation (Ft MSL)	Miles of River Impacted (upstream of Existing Pool)*	Storage Volume Increase (TAF)*	Option would most likely be considered if:
New Pardee / Impounds to Existing Pool	568	0	33	New embankment called for
New Pardee / Impounds to appx 600' below Hwy 49 (Middle Bar Bridge road deck elev.)	590	1.0	92	No impacts to key whitewater features and BLM take out called for
New Pardee / Impounds to Hwy 49 Bridge	595	1.2	104	Minimal impacts to BLM takeout, no impacts upstream of Hwy 49 called for
New Pardee / Impounds slightly less than 1000' past Hwy. 49 Bridge	600	1.4	126	Maximizing partnership benefits, no impacts to the Electra features called for

* Based on preliminary review, additional field and engineering work need to verify.

Reference: Pardee Reservoir Enlargement Project, Preliminary Design Report, Volume 1 - Summary Technical Report, **June 1998.**

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The Selected WSMP 2040 Preferred Portfolio

- Rationing — Up to 15%
- Conservation — 39 MGD
- Recycling — 11 MGD
- Included Supplemental Supply Components Determined to be Feasible:

  Northern California water transfers, Bayside Groundwater Project Phase 2, Sacramento Basin groundwater banking, regional desalination, enlarge Lower Bear Reservoir, enlarge Pardee Reservoir, Mokelumne Inter-Regional Conjunctive Use Project (IRCUP)

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Ongoing Activities and Actions

Ongoing Actions

- Recycled Water - RARE operational, Master Plan finalized
- Conservation - 20 x 2020 approach finalized and Master Plan nearly final
- Groundwater - Bayside Phase 1 - 1st year start-up testing completed; Groundwater Management Plan prep. initiated
- Freeport - FRWP completed

Since Adoption of WSMP 2040

- Nov. 2009 - Legal challenge to WSMP CEQA process
- May 2011 - EBMUD Board initiates PEIR revision effort

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CEQA Revisions

15

CEQA Challenge

Ruling Issued April 2011

Identified deficiencies / PEIR revisions

- Impacts & Mitigation of Enlarge Pardee regarding:
  - The Middle Bar Run
  - Native Miwok ancestral gathering places
  - Use of Middle Bar Bridge as an emergency evacuation route
- Need for more analysis of another possible alternative:
  - Participation in the project to expand Los Vaqueros Reservoir

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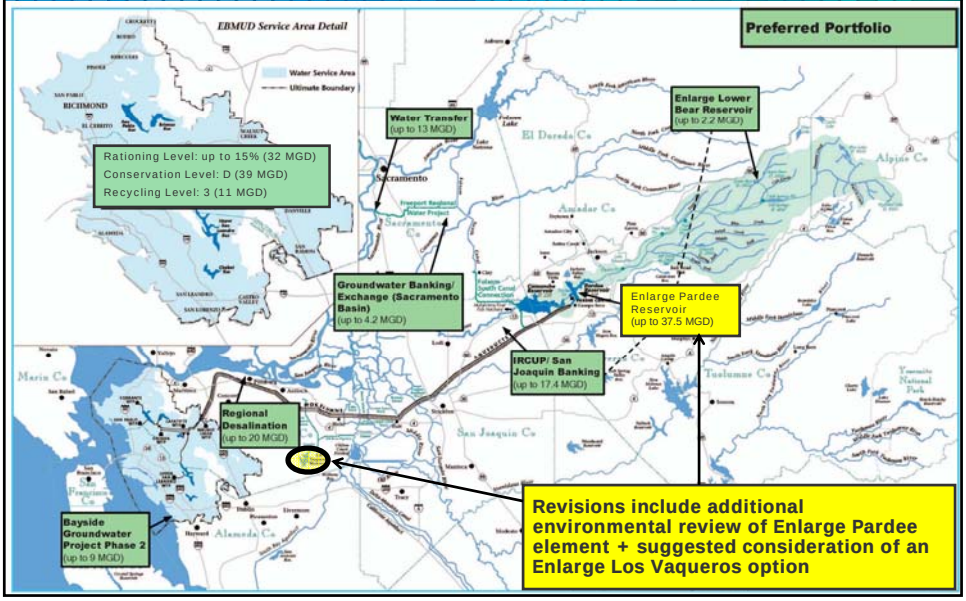
WSMP 2040 Preferred Portfolio: Revisions



PEIR Revision Effort

- EBMUD staff and consultants:
  - Gathered additional information to address PEIR deficiencies
  - Contacted key groups and individuals
  - Completing PEIR analysis and will be issuing a draft supplement revising PEIR

18

Notice of Preparation / Scoping Effort

19

NOP Scoping Effort

Details:

- Key Dates
  - Notice of Preparation - released June 23
    - Public comment on the scope
    - 3 meetings held in Oakland (Alameda Co.), Jackson (Amador Co.), and San Andreas (Calaveras Co.)
  - NOP Comment period – closed July 29
  - NOP Scoping Report – released mid-September

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NOP Scoping Report

Comments Received:

- Government Agencies/Elected Officials:
  - 19 responses representing 17 agencies
    - Includes 4 oral comments from elected officials
- Environmental Groups and Non-Profits:
  - 21 responses representing 16 groups
- Members of the Public:
  - 114 responses
- Comments on Middle Bar Run and Middle Bar Bridge use by local residents:
  - Eliminate Enlarge Pardee from preferred portfolio or replace with Enlarge Los Vaqueros
  - Support for retaining the regional upcountry component if the component includes upcountry partners and benefits for upcountry agencies

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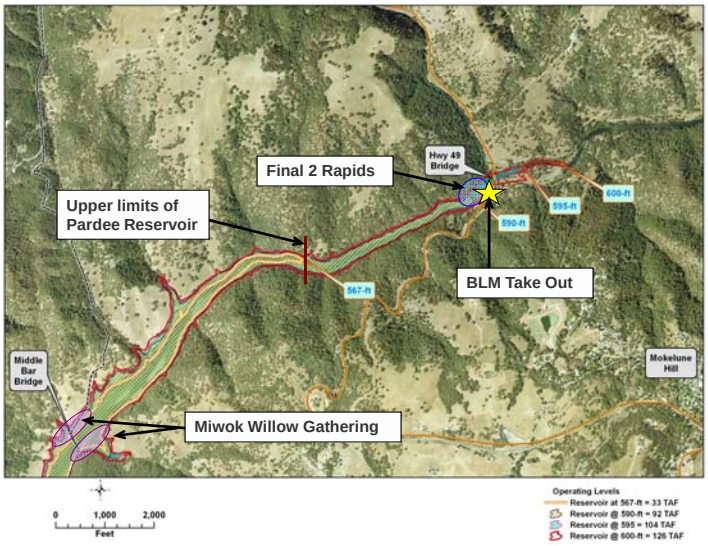
Revision Effort / Enlarge Pardee Reservoir

22

Revision Effort: Enlarge Pardee Reservoir Middle Bar Run



23

Revision Effort: Enlarge Pardee Reservoir Middle Bar Run (Rapids / Water Features)

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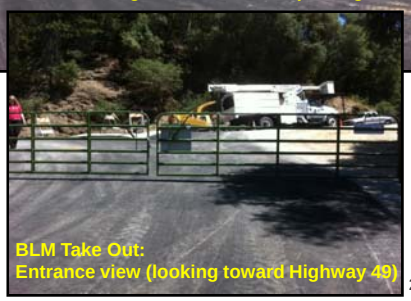
Revision Effort: Enlarge Pardee Reservoir
BLM Take Out Facilities

BLM Take Out:
Road leading down to launch / parking

BLM Take Out:
Parking / Restroom Facilities at the Base



BLM Take Out:
Entrance view (looking toward Highway 49)

25

Middle Bar Reach

Details:

- **Contacted:**
  - OARS
- **Research revealed:**
  - Rapids present at the top end of Middle Bar Run (near BLM Take Out)
    - "Toilet Bowl" Rapid approx. 900 ft. from Hwy. 49 bridge
  - Online whitewater guides classify the "Toilet Bowl" rapid as Class III
  - Existing Pardee Reservoir extends nearly ½ way into the Middle Bar Run
  - Staff observations indicate that primary period of use = spring and summer months
  - BLM take out would require modifications for any reservoir pool elevation greater than 595'
- **Next Steps:**
  - Incorporate into Revised PEIR
  - Identify (at a program level) mitigation options

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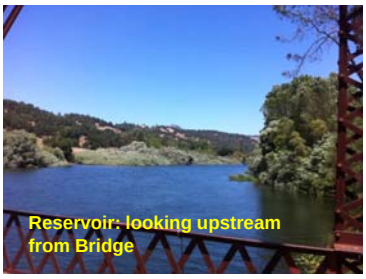
Revision Effort: Enlarge Pardee Reservoir Middle Bar Bridge / Emergency Access


Fishing from Bridge

Bridge Iron Work


Reservoir: looking upstream from Bridge


Bridge Deck: Looking south (toward Amador Co.)

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Emergency Access

- **Contacted Key Agencies / Responders in August 2011**
  - Mokelumne Hill Fire Protection District (response received)
  - Awaiting Response From:
    - CAL FIRE
    - Amador Fire Protection District
    - Amador County Office of Emergency Services
    - Calaveras County Office of Emergency Services
- **Contact revealed:**
  - No written / formalized evacuation plans are in place
  - Commercial trucks use bridge, but bridge's weight limitation is not known
  - Removal of bridge would delay response time and could present a hazard
  - Suggested that mitigation option(s) may be to replace the bridge. Other options may be available
- **Next Steps:**
  - Incorporate into Revised PEIR
  - Identify (at a program level) mitigation options

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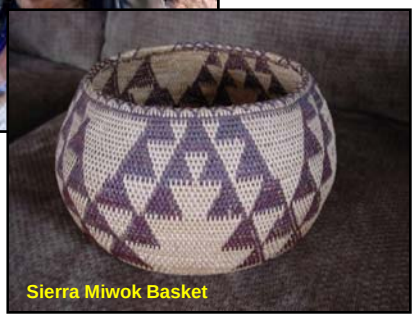
Revision Effort: Enlarge Pardee Reservoir
Willow Gathering / Miwok

Willow gathering near Middle Bar Bridge
Photo Credit: Craig Sanders / The Record



Sierra Miwok Basket

29

Miwok

- **Contacted:**
  - Native American Heritage Commission (Letter dated August 16, 2011)
  - 14 Native American contacts identified by the Native American Heritage Commission
  - Telephone call with Arvada Fisher, Vice Chairperson of the Calaveras County Mountain Miwok Indian Council
- **Contacts revealed:**
  - Tribes identified = Miwok (various Bands)
  - Primary use of River = Bank Areas for Plant Collection (near Middle Bar Bridge) for basketry and medicinal uses
- **Next Steps:**
  - Continue and contact with Native Americans to identify cultural resources
  - Identify (at a program level) mitigation options

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Revision Effort / Enlarge Los Vaqueros Participation

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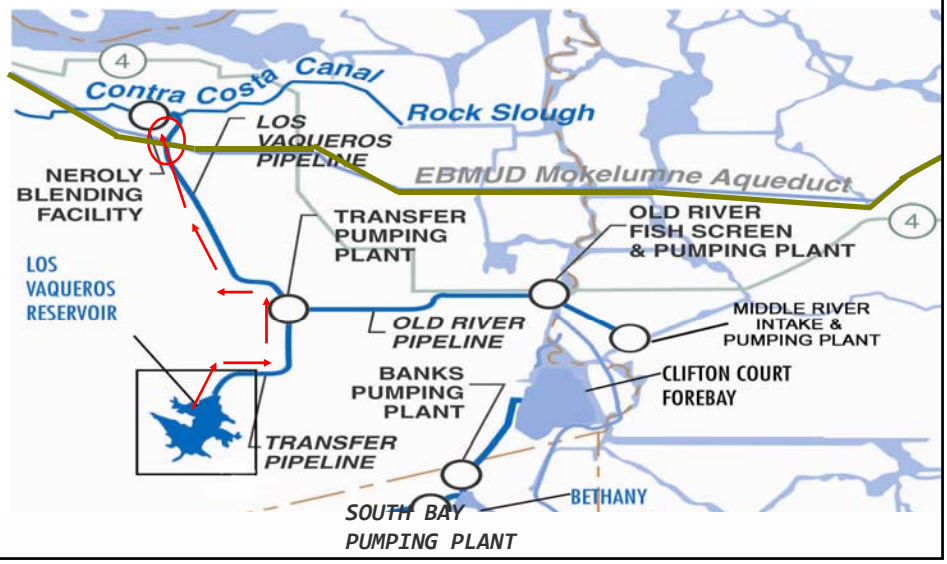
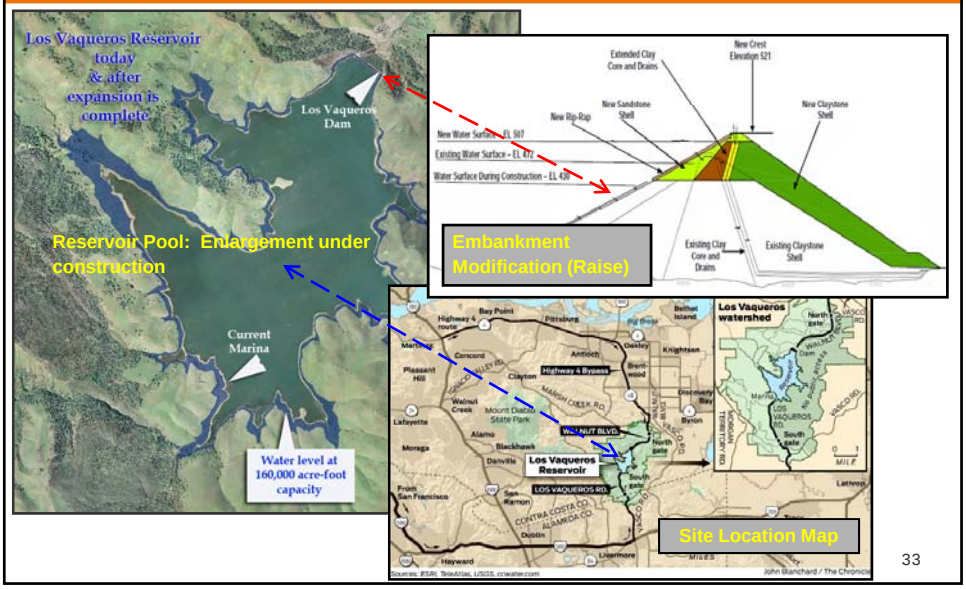
Revision Effort (Enlarge Los Vaqueros Participation)



Revision Effort
(ELV Current Construction)



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ELV Participation:
Preliminary Analysis by Staff

DELIVERY OPTION	Existing Raise (Option 1)	Existing Raise (Option 2)	Future Raise
DELIVERY POINT	BOYD RD INTERTIE	CCWD-EBMUD INTERTIE AT MOK AQ #2	CCWD-EBMUD INTERTIE AT MOK AQ #2
LOCATION	Walnut Creek	Brentwood	Brentwood
ELV WATER TYPE	Treated	Raw	Raw
MAX DELIVERY RATE	8 mgd	45 mgd	45 mgd
3-YR VOL DELIVERED	18-21 TAF	29 TAF	100 TAF
POTENTIAL OPERATIONS CONSTRAINTS	• Unknown operational constraints	• Unknown operational constraints	• Requires major modifications to EBMUD's operations plan
RESTRICTIONS	• Limited ability to transmit water through distribution system during winter months	• Impacts availability and timing of spare aqueduct capacity due to other water supply components	• Impacts availability and timing of spare aqueduct capacity due to other water supply components
ADDITIONAL IMPROVEMENTS REQUIRED	• Minor distribution system piping and WQ management improvements	• Isolation of Mok Aqueducts required. (If no isolation, decreases total delivery by 8 TAF) • Additional treatment required	• Isolation of Mok Aqueducts required. • Additional treatment required
COMMENTS	• Independent of raw water supplies • Water quality variation • No cost information	• Freeport (CVP) delivery limited to Mok Aq No. 1 & 2 • Delivery in years 2&3 only • Water quality variation • No cost information	• Freeport (CVP) delivery allowed in any of the Mokelumne Aqueducts • Delivery in years 2&3 only • Water quality variation • EBMUD would cover bulk of construction costs

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Significant and Unavoidable Impacts of ELV (from CCWD's EIR/EIS)

Expansion to 160 TAF

- Loss of grassland habitat that is a potential movement corridor for the San Joaquin kit fox

Expansion to 275 TAF

- Loss of grassland habitat that is a potential movement corridor for the San Joaquin kit fox
- Conversion of 22 acres of state-designated Important Farmland
- Potential for entrainment of fish from increased pumping during fish-sensitive months

Additional mitigable significant impacts were identified for Hydrology, Geology, Delta Fisheries and Aquatic Resources, Biological Resources, Land Use, Transportation, Air Quality, Noise, Utilities, Hazards, Cultural Resources, Recreation, and Aesthetics.

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ELV Considerations

Considerations:

- Cost to participate in near-term project
- Water quality variation
- Ability to develop partnership for future program
- Delta uncertainties
- Energy use / greenhouse gas generation

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Break

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Portfolio / Next Steps

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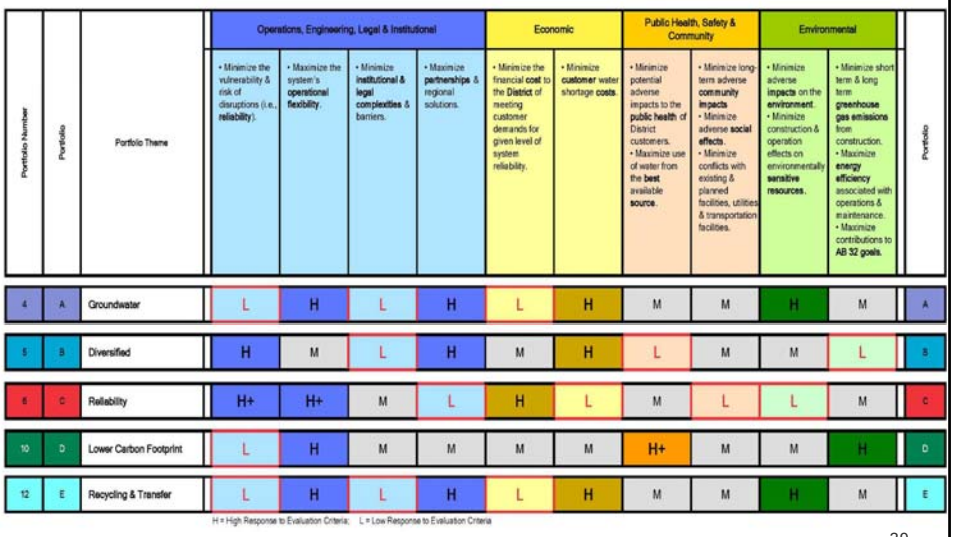
Portfolio Development Process: Ranking of the Final 5



Portfolio Number	Portfolio	Portfolio Theme	Operations, Engineering, Legal & Institutional				Economic		Public Health, Safety & Community		Environmental		Portfolio
			• Minimize the vulnerability & risk of disruptions (i.e., **reliability**).	• Maximize the system's **operational flexibility**.	• Minimize **institutional & legal complexities** & barriers.	• Maximize **partnerships** & regional solutions.	• Minimize the financial **cost** to the **District** of meeting customer demands for given level of system reliability.	• Minimize **customer** water shortage **costs**.	• Minimize potential adverse impacts to the **public health** of District customers. • Maximize use of water from the **best** available **source**.	• Minimize long-term adverse **community impacts**. • Minimize adverse **social effects**. • Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	• Minimize adverse **impacts** on the **environment**. • Minimize construction & operation effects on environmentally **sensitive resources**.	• Minimize short term & long term **greenhouse gas emissions** from construction. • Maximize **energy efficiency** associated with operations & maintenance. • Maximize contributions to **AB 32 goals**.	
4	A	Groundwater	L	H	L	H	L	H	M	M	H	M	A
5	B	Diversified	H	M	L	H	M	H	L	M	M	L	B
6	C	Reliability	H+	H+	M	L	H	L	M	L	L	M	C
10	D	Lower Carbon Footprint	L	H	M	M	M	M	H+	M	M	H	D
12	E	Recycling & Transfer	L	H	L	H	L	H	M	M	H	M	E

H = High Response to Evaluation Criteria; L = Low Response to Evaluation Criteria

39

Desired Preferred Portfolio Features

- **A robust plan**: needed in light of future uncertainty (e.g., global climate change)
- **Multiple, parallel** project components
- **A diverse and flexible** strategy
- **Environmentally** sound

40

Demand Shortfall (Need for Water)

From EBMUD's UWMP 2010 ***(3-yr drought, averaged)***

- **Total Need = 313 MGD, met as follows:**
  - 120 mgd Mokelumne and Local Runoff
  - 49 mgd Freeport Regional Water Project
  - 1 mgd Bayside Groundwater Project Phase 1
  - 20 mgd Recycled Water (on-line by 2040)
  - 62 mgd Conservation (implemented by 2040)
  - 27 mgd Rationing (assumes 4% drought yr 1, 15% yrs 2 and 3)

  = **34 mgd Shortfall (as met by Supplemental Supply projects)**

41

Portfolio Update

Portfolio:

- "Near Term" Portfolio Components
  - Conservation Level D, 11 MGD Recycling, Up to 15% Rationing, Water Transfers, Bayside Phase 2, Sacramento Groundwater and Enlarge Los Vaqueros (current CCWD project)
  - Approach: Implement in 2013-2030 as demands recover
- Uncertainty Factors - Driving the need for "Long Term" Component(s)
  - Climate Change
  - Future population growth and associated water demand
  - Mokelumne hydrology and associated increasing limits on supply
  - Uncertainty of ultimate yield for "near-term" portfolio components
  - Uncertain yield from Regional Partnership projects
- "Long Term" Portfolio or Options
  - Regional Desalination, Mokelumne Regional Project, or Future Los Vaqueros Raise
  - Approach - continue partnership discussions anticipating a need in the 2030-2040 time frame

42

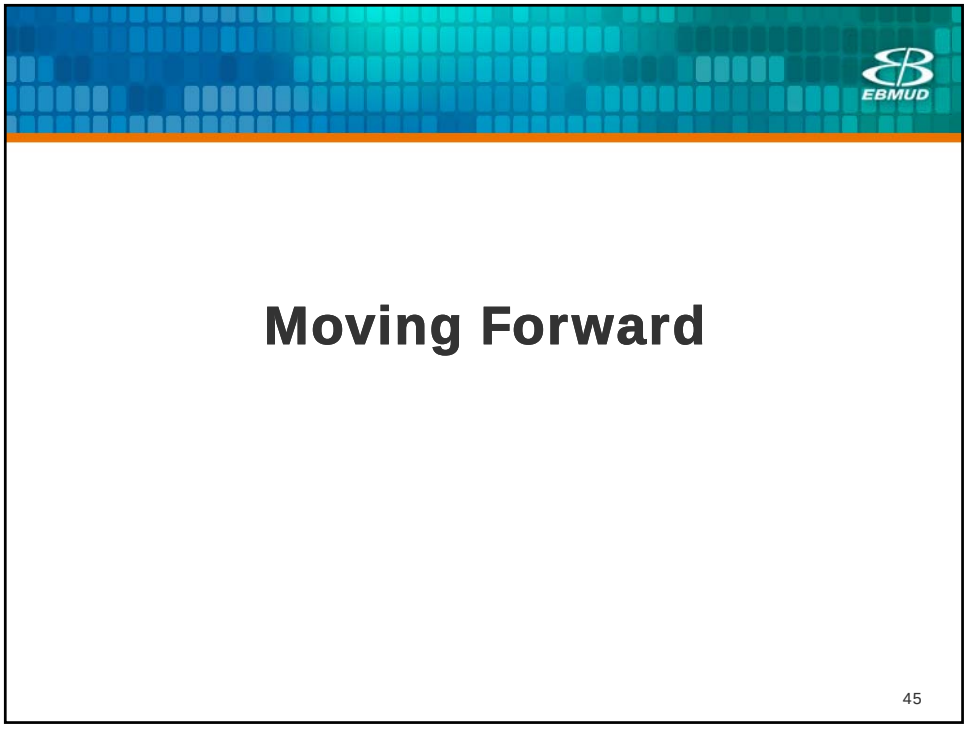
Moving Forward

- Key Dates
  - Draft Revised PEIR - release in November 2011
    - 3 public workshops proposed to collect comments (Oakland, Jackson, San Andreas)
  - Final Revised PEIR - release in February 2012
    - Possible Board Workshop to review PEIR comments as received from the public
  - Board Consideration - March 2012

43

Public Comments

44


EBMUD
Moving Forward
45

EAST BAY MUNICIPAL UTILITY DISTRICT

WSMP 2040 Board Workshop
Revisions to the PEIR

March 27, 2012

Presentation Summary

EBMUD

1. Background, Previous Workshop
2. Draft Revised Program Environmental Impact Report
3. Comments Received
4. Revisions to WSMP 2040 Plan
5. Public Comments
6. Board Comments

2

Background: CEQA Challenge

- Ruling issued April 2011
- Identified deficiencies/PEIR revisions
  - Impacts & Mitigation of Enlarge Pardee regarding:
    - The Middle Bar Run
    - Native Miwok ancestral gathering places
    - Use of Middle Bar Bridge as an emergency evacuation route
  - Need for more analysis of another possible alternative:
    - Participation in the project to expand Los Vaqueros Reservoir

3

Background: WSMP 2040 - Revised PEIR Timeline

April 2011	Court identified specific deficiencies to the PEIR that require revisions
June 23, 2011	Notice of Preparation (NOP) issued
July 13,14 & 21, 2011	Scoping meetings held in Jackson, San Andreas, and Oakland, CA
December 9, 2011	EBMUD releases Draft Revised PEIR for public comment
January 11, 12 & 17, 2012	Draft Revised PEIR comment meetings held in Jackson, San Andreas, and Oakland, CA
January 27, 2012	Draft Revised PEIR comment period closed
March 27, 2012	WSMP Workshop
April 24, 2012	Board consideration for certification/approval

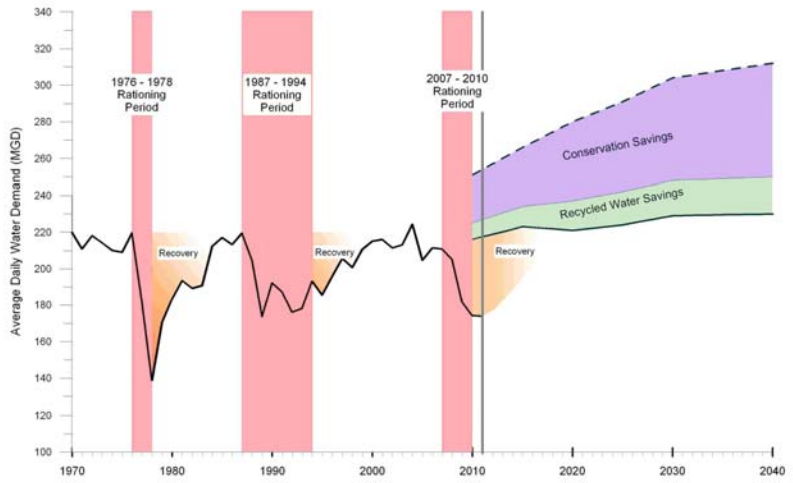
4

Response to Board Questions
Sept. 27, 2011 WSMP 2040 Board Workshop

Board Request	Staff Follow-up
Update the Demand Slide to include FY 11 Demand	Provided to EBMUD Board as part of this workshop
Can local economic trends be added to EBMUD's "historic water demand over time" slide	No direct correlation was identified due to a number of factors in play at once (supply availability, drought occurrence, economic downturn, weather, etc)
Include data for the FY11 water year on the slide showing river hydrology	Provided to EBMUD Board as part of this workshop
Gather weight/load limitation information for Middle Bar Bridge	Two Axle = 14 Tons; Three Axle = 15 Tons; Four Axle = 16 Tons
Provide a listing of new facilities as needed for EBMUD participation in an ELV project	Provided to the EBMUD Board as part of this workshop
Schedule a Board field trip to the Expand Los Vaqueros construction site	Field trips to the ELV construction site were held on November 18 and December 10, 2011
Determine if a vote was held in the EBMUD service area in the 1960s regarding the potential to combine service areas with CCWD	No such vote took place. Actions during the 1960's were part of a state-wide effort to determine Special District boundaries
Hold a rate structure workshop	Rate discussions take place separately from WSMP 2040

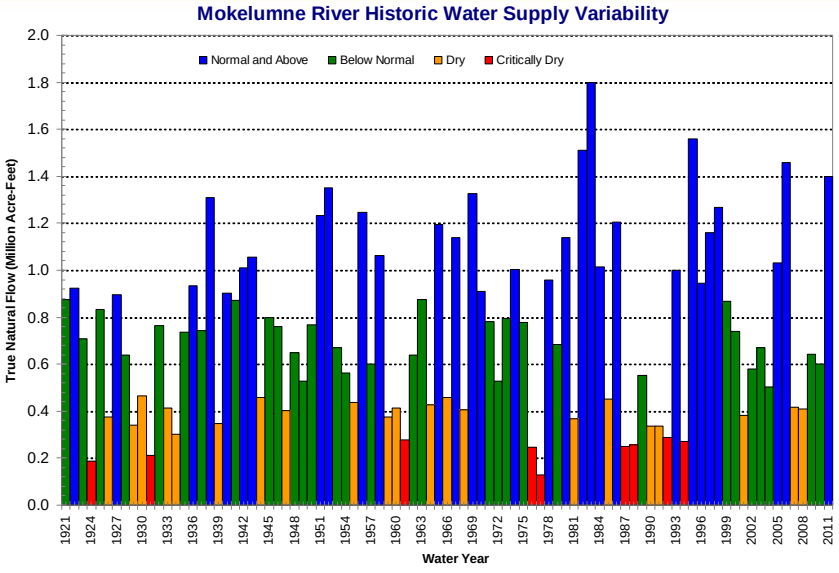
5

Historic and Projected Demand



6

Hydrologic Variability: Mokelumne Basin Runoff



7

Expand Los Vaqueros: New EBMUD Facilities Required

Option	Improvement	Purpose
Receive treated water from Los Vaqueros via Boyd Road Interties	11,000 LF of 24" dia. pipe Instrumentation and controls 12 mgd pump station	Facilitate distribution of treated water
Receive treated water from Los Vaqueros via new intertie at Geary Rd/Buena Vista Rd (Walnut Creek)	7,000 LF of 24" dia. pipe 12 mgd pumping plant Instrumentation and controls	To allow for possible continuous summer and winter operations. Facilitate distribution of treated water
Receive raw water from Los Vaqueros	Check valve(s)/replacement or retrofit (two 60" dia) Mokelumne Aqueducts Interconnection Possible treatment plant upgrades	Check valves to isolate non-Pardee water from inline filtration plants Intertie/connection to improve aqueduct conveyance capacity

Note: New facilities based on concept level planning; additional detailed analysis required.

8

Draft Revised Program Environmental Impact Report (PEIR)

9

PEIR Revisions: Land Use & Recreation Analysis

- Added - Enlarge Pardee Reservoir component environmental setting (Middle Bar Run region)
  - Expanded discussion of:
    - The middle bar section
    - The recently constructed BLM take-out facility
    - Public access elements
- Added - Impacts to the Middle Bar Run (and potential mitigation)
  - Impact to white water use deemed potentially significant

10

PEIR Revisions: Cultural Resources Analysis

- Added - Impacts of an Enlarge Pardee Project on the Miwok (cultural component)
  - Met with Miwok representatives to better understand how the Middle Bar area is used
  - Analysis Concluded:
    - Primary use - willow gathering
    - Impacts potentially significant, could be reduced to less than significant with mitigation

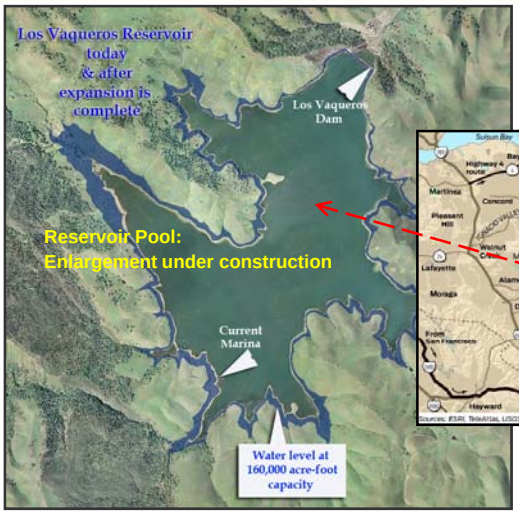
11

PEIR Revisions: Hazard Analysis

- Added: Enlarge Pardee Reservoir component environmental setting/use of Middle Bar Bridge for emergency access
  - Expanded discussion of:
    - Use of Bridge by emergency personnel and local residents (and adjacent roads) should emergency evacuation be necessary
- Added: Impacts to emergency access (and potential mitigation) from an Enlarge Pardee component
  - Impact of the potential loss of the emergency access:
    - Mitigation opportunities were identified that would lower that risk to less than significant

12

Consider Participation in Los Vaqueros Reservoir Expansion



Current Construction Underway

- To 160 TAF (from 100 TAF)

13

PEIR Revisions: Participation in Los Vaqueros (LV) Expansion

- The current LV expansion project
  - Existing off-stream storage reservoir owned by Contra Costa Water District (CCWD)
  - Reservoir expansion construction will create 160 TAF of storage
  - Approx. 20-30 TAF of storage may be available for EBMUD use (as a partner with CCWD)
  - Water stored in wet years by EBMUD for use during dry years
  - Water quality (per CCWD) = 50-70 mg/l CL (for comparison purposes, FRWP approaches >10 mg/l CL)
- A future, larger LV expansion
  - Greater uncertainties/more complexities

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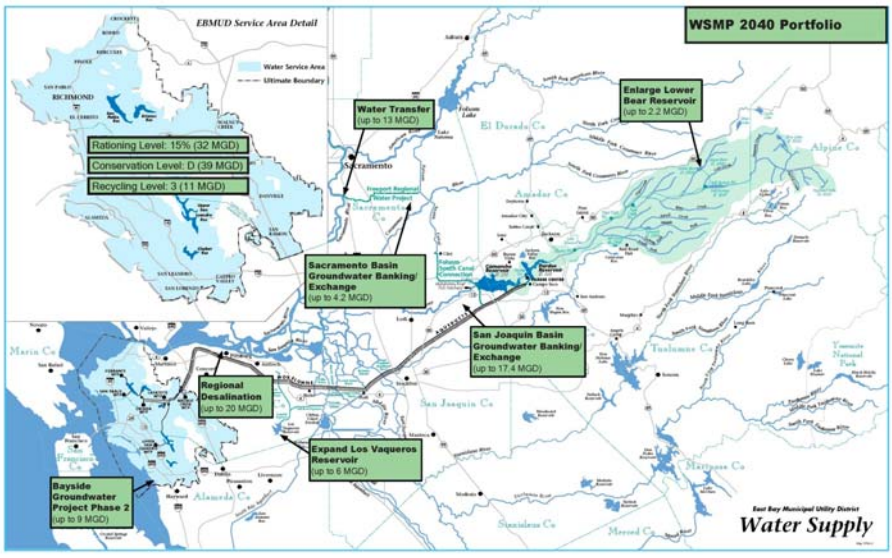
PEIR Revisions:
Staff Recommendations for Revised WSMP 2040

- Add participation in LV Expansion (to 160 TAF under construction)
- Do not include Enlarge Pardee or future LV Expansion in WSMP 2040 Portfolio
- Remainder of WSMP 2040 Portfolio of policies and supplemental projects remain unchanged

15

Staff Recommendation:
EBMUD's Portfolio for 2040



Draft Revised PEIR: Comments Received

17

Draft Revised PEIR Comments: Generated at Public Meetings

Meeting Location & Date	# of Attendees	# of Speakers	Prevailing Comment(s)
Jackson, CA Jan. 11, 2012	14	4 (1 Elected, 2 NGOs, 1 Citizen)	Appreciative of revisions/support for staff recommendations
San Andreas, CA Jan. 12, 2012	12	8 (1 Elected, 1 NGO, 6 Citizens)	Appreciative of revisions/support for staff recommendations
Oakland, CA Jan. 17, 2012	4	3 (3 NGOs)	Appreciative of revisions/support for staff recommendations
TOTAL	**30**	**15**	**Appreciative/Supportive**

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Draft Revised PEIR: Written Comments (emails/letters)

- Government Agencies/Elected Officials
  - 1 Agency
    - State Clearinghouse
- Environmental Groups and Non-Profits
  - 5 groups
    - Prevailing comment = support staff recommendations
- Members of the Public
  - 34 responses
    - Prevailing comment = support staff recommendations

19

Issues Raised in Comments

- Thank You
- Follow Staff Recommendation
- Wild & Scenic Designation
- Calaveras Planning Coalition
  - 26 comments (26 pages)
  - Many issues exceed scope of revision including:
    - Inaccurate demand projections
    - Additional conservation and demand management measures
    - Insufficient alternatives analysis
    - Wild & Scenic designation
- Sierra Club
  - 6 comments
  - Support removal of Enlarge Pardee per staff recommendation
  - Qualified support for inclusion of Expand Los Vaqueros
  - Asked if other elements, such as Raise Lower Bear, could be deferred
- American White Water
  - Questioned Middle Bar usage statistics

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Key Dates Moving Forward

- Release Final Revised PEIR - April 12, 2012
- Board Certification Hearing - April 24, 2012

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Revisions to WSMP 2040 Final Plan

Chapter	Primary Revisions
1	Discussion of the CEQA effort following the legal challenge; Insertion of Expand Los Vaqueros (ELV) component and removal of Enlarge Pardee component from the WSMP 2040 Portfolio
2	Insertion of ELV and removal of Enlarge Pardee Reservoir component from the WSMP 2040 Portfolio
3	Discussion of recent water conservation legislation (SBx7-7)
5	Discussion of the CEQA effort following the legal challenge
6	Insertion of the ELV component and removal of the Enlarge Pardee Reservoir component from the WSMP 2040 portfolio
4, 7, 8, & 9	No significant revisions

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Public Comments

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Board Comments

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Appendix E2

WSMP 2040 Meeting Presentations

Community Liaison Committee (CLC) Meetings

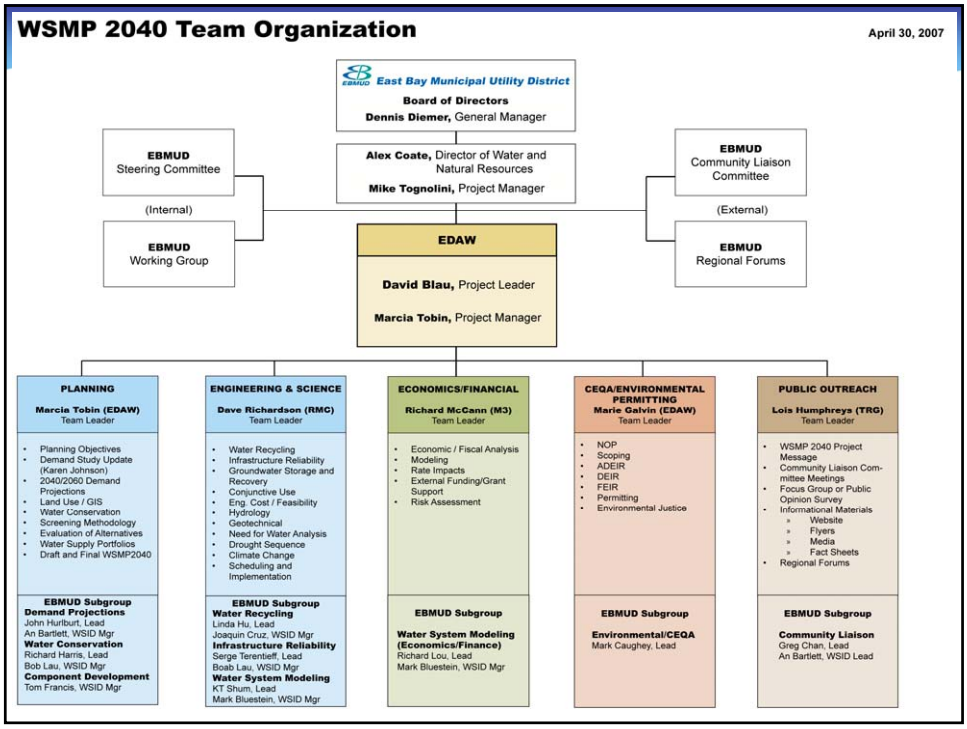
Water Supply Management Program 2040

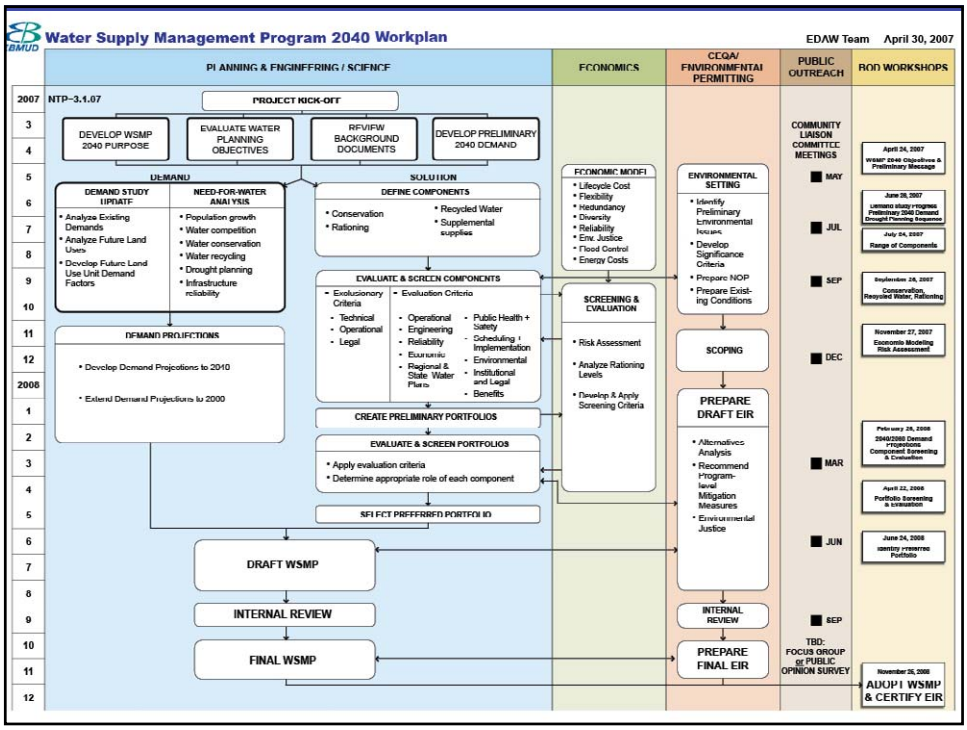
Community Liaison Committee
First Meeting
May 1, 2007

Water Supply Management Program 2040

Agenda May 1, 2007

1. **Welcome and Introduction** - Lesa McIntosh, EBMUD Board President
2. **CLC Governing Procedures** - Lois Humphreys, TRG & Associates
3. **EBMUD System Overview** - Mike Tognolini, EBMUD
4. **Project Workplan and Schedule** - Dave Blau, EDAW
5. **Board Workshop No.1 Project Overview** - Dave Blau, EDAW
6. **WSMP 2040 Project Objectives** - Dave Blau, EDAW
7. **Schedule future CLC Meetings and Locations** - Lois Humphreys, TRG & Associates
8. **Other Comments or Questions** - Lois Humphreys, TRG & Associates
9. **Public Comment** - Lois Humphreys, TRG & Associates


WSMP 2040 Team Organization
April 30, 2007
East Bay Municipal Utility District
Board of Directors
Dennis Diemer, General Manager
Alex Coate, Director of Water and Natural Resources
Mike Tognolini, Project Manager
EBMUD Steering Committee
(Internal)
EBMUD Working Group
EBMUD Community Liaison Committee
(External)
EBMUD Regional Forums
EDAW
David Blau, Project Leader
Marcia Tobin, Project Manager
PLANNING
Marcia Tobin (EDAW)
Team Leader
Planning Objectives
Demand Study Update (Karen Johnson)
2040/2060 Demand Projections
Land Use / GIS
Water Conservation
Screening Methodology
Evaluation of Alternatives
Water Supply Portfolios
Draft and Final WSMP2040
EBMUD Subgroup
Demand Projections
John Hurlburt, Lead
An Bartlett, WSID Mgr
Water Conservation
Richard Harris, Lead
Bob Lau, WSID Mgr
Component Development
Tom Francis, WSID Mgr
ENGINEERING & SCIENCE
Dave Richardson (RMC)
Team Leader
Water Recycling
Infrastructure Reliability
Groundwater Storage and Recovery
Conjunctive Use
Eng. Cost / Feasibility
Hydrology
Geotechnical
Need for Water Analysis
Drought Sequence
Climate Change
Scheduling and Implementation
EBMUD Subgroup
Water Recycling
Linda Hu, Lead
Joaquin Cruz, WSID Mgr
Infrastructure Reliability
Serge Terentieff, Lead
Boab Lau, WSID Mgr
Water System Modeling
KT Shum, Lead
Mark Bluestein, WSID Mgr
ECONOMICS/FINANCIAL
Richard McCann (M3)
Team Leader
Economic / Fiscal Analysis
Modeling
Rate Impacts
External Funding/Grant Support
Risk Assessment
EBMUD Subgroup
Water System Modeling (Economics/Finance)
Richard Lou, Lead
Mark Bluestein, WSID Mgr
CEQA/ENVIRONMENTAL PERMITTING
Marie Galvin (EDAW)
Team Leader
NOP
Scoping
ADEIR
DEIR
FEIR
Permitting
Environmental Justice
EBMUD Subgroup
Environmental/CEQA
Mark Caughey, Lead
PUBLIC OUTREACH
Lois Humphreys (TRG)
Team Leader
WSMP 2040 Project Message
Community Liaison Committee Meetings
Focus Group or Public Opinion Survey
Informational Materials
Website
Flyers
Media
Fact Sheets
Regional Forums
EBMUD Subgroup
Community Liaison
Greg Chan, Lead
An Bartlett, WSID Lead


Water Supply Management Program 2040 Workplan
EDAW Team April 30, 2007
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
2007
2008
NTP-3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP PRELIMINARY 2040 DEMAND
DEMAND
SOLUTION
DEMAND STUDY UPDATE
Analyze Existing Demands
Analyze Future Land Uses
Develop Future Land Use Unit Demand Factors
NEED-FOR-WATER ANALYSIS
Population growth
Water competition
Water conservation
Water recycling
Drought planning
Infrastructure reliability
DEMAND PROJECTIONS
Develop Demand Projections to 2040
Extend Demand Projections to 2000
DEFINE COMPONENTS
Conservation
Rationing
Recycled Water
Supplemental supplies
EVALUATE & SCREEN COMPONENTS
Evolutionary Criteria
Technical
Operational
Legal
Evaluation Criteria
Operational
Engineering
Reliability
Economic
Regional & State Water Plans
Public Health + Safety
Scheduling + Implementation
Environmental
Institutional and Legal
Benefits
CREATE PRELIMINARY PORTFOLIOS
EVALUATE & SCREEN PORTFOLIOS
Apply evaluation criteria
Determine appropriate role of each component
SELECT PREFERRED PORTFOLIO
DRAFT WSMP
INTERNAL REVIEW
FINAL WSMP
ECONOMIC MODEL
Lifecycle Cost
Flexibility
Redundancy
Diversity
Reliability
Env. Justice
Flood Control
Energy Costs
SCREENING & EVALUATION
Risk Assessment
Analyze Rationing Levels
Develop & Apply Screening Criteria
ENVIRONMENTAL SETTING
Identify Preliminary Environmental Issues
Develop Significance Criteria
Prepare NOP
Prepare Existing Conditions
SCOPING
PREPARE DRAFT EIR
Alternatives Analysis
Recommend Program-level Mitigation Measures
Environmental Justice
INTERNAL REVIEW
PREPARE FINAL EIR
COMMUNITY LIAISON COMMITTEE MEETINGS
MAY
JUL
SEP
DEC
MAR
JUN
SEP
TBD: FOCUS GROUP or PUBLIC OPINION SURVEY
April 24, 2007
WSMP 2040 Objectives & Preliminary Message
June 26, 2007
Climate Study Progress Preliminary 2040 Demand Drought Planning Sequence
July 24, 2007
Range of Components
September 25, 2007
Conservation, Recycled Water, Rationing
November 27, 2007
Economic Modeling Risk Assessment
February 26, 2008
2040/2060 Demand Projections Completed Screening & Evaluation
April 22, 2008
Portfolio Screening & Evaluation
June 24, 2008
Identify Preferred Portfolio
November 25, 2008
ADOPT WSMP & CERTIFY EIR

Water Supply Management Program 2040

Public Outreach Program

Key Strategies

- Regular meetings with the Community Liaison Committee
- Meetings with Regional Forums as needed
- Public Opinion Survey or Focus Group
- Program EIR Public Participation

Water Supply Management Program 2040

WSMP 2020 Planning Objectives

(Adopted 1993)

Operations, Engineering, Legal and Institutional

Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges.

Economic

Minimize total direct costs to District customers

Public Health, Public Safety & Sociocultural

Maintain the high quality of the District's water supply. This includes taking steps to ensure that the District's potable water will meet all existing and anticipated drinking water standards; and that the District's non-potable water is of a quality suitable to its use.

Maintain outdoor recreation opportunities.

Minimize risks to public health and safety.

Minimize adverse sociocultural impacts

Biological

Protect and improve the biological resources that could be affected by existing District facilities or by the Composite Program

Exhibit 2 (page 1 of 5)
Screening Criteria
Operations, Engineering, Legal and Institutional Criteria

Objectives

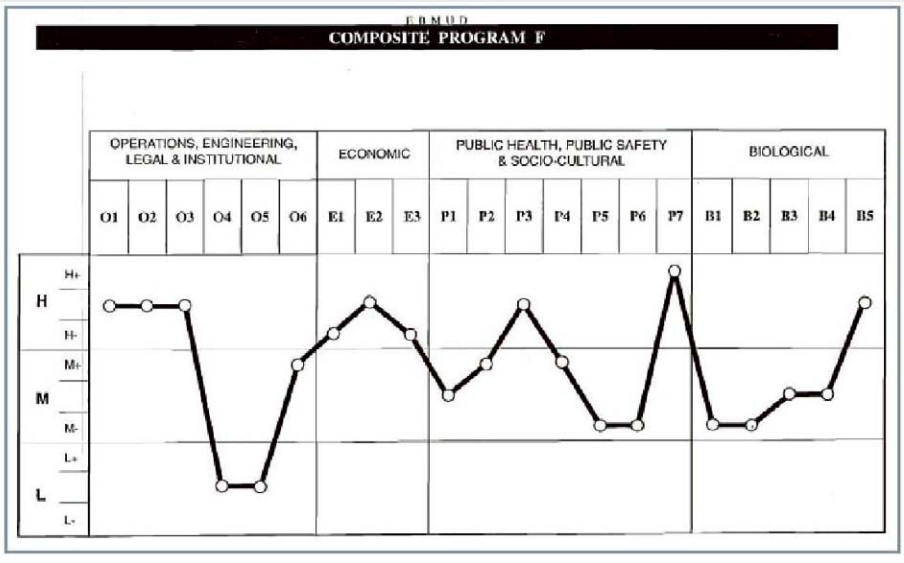
- Provide adequate capacity, flexibility and reliability to respond to the problems and challenges. (See Section 2.1)

Screening Criteria - Exclusionary Criteria

Ox1	The program components and Composite Program must be technically feasible. It must be possible to develop and operate the program components and Composite Programs based on accepted, state-of-the-art engineering considerations.
Ox2	Existing facilities and program components must not be located in an area of, or constitute, unmitigable geologic, hydrologic or toxic/hazardous materials hazards.
Ox3	The program components and Composite Program must be logistically (i.e. legally and institutionally) feasible (i.e. must be available or capable of being made available). The Composite Program must meet all existing and anticipated water rights permit and license conditions and all dam and reservoir operating permit conditions, including releases for instream uses and downstream users.
Ox4	The Composite Program must ensure that the District can handle the Drought Planning Sequence including a Maximum Drought Management Program.

Screening Criteria - Evaluating Criteria

O1	The program components and Composite Program should minimize the risk of disruptions in service by maximizing the institutional reliability of service.
O2	The program components and Composite Program should minimize the risk of disruptions in service by maximizing the technical reliability of service.
O3	The program components and Composite Program should maximize the system's operational flexibility to respond to change (including changes in water demands).
O4	The program components and Composite Program should maximize the system's implementation flexibility to respond to change (including incremental implementation or phasing of components as demands and needs change).
O5	The program components and Composite Program should minimize logistical (i.e. legal and institutional) problems.
O6	The Composite Program should minimize rationing due to drought.



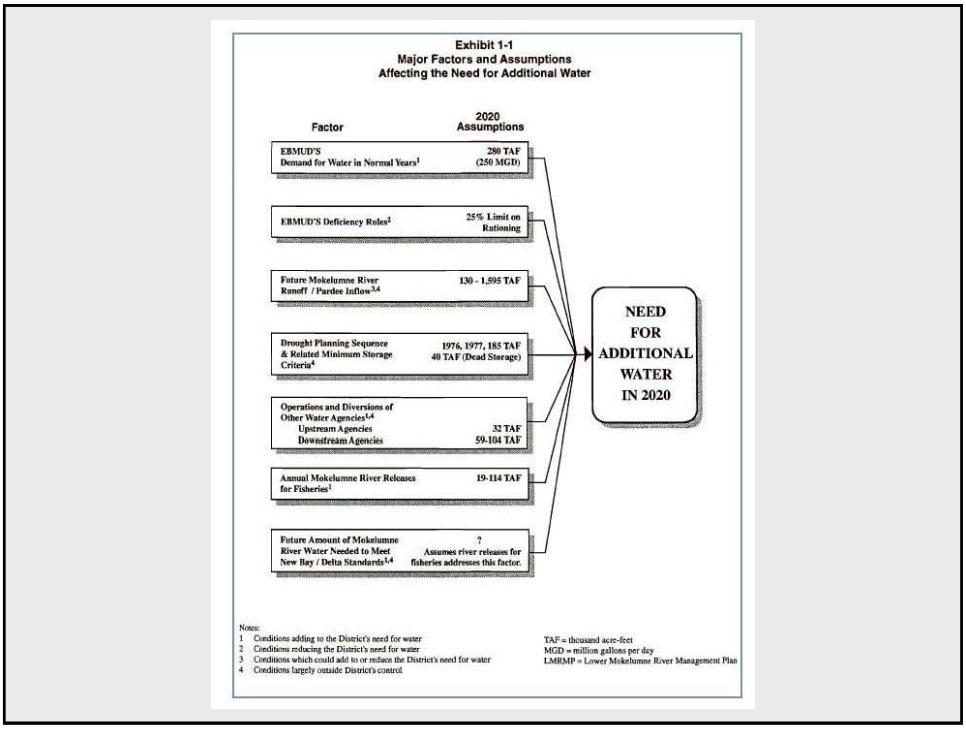


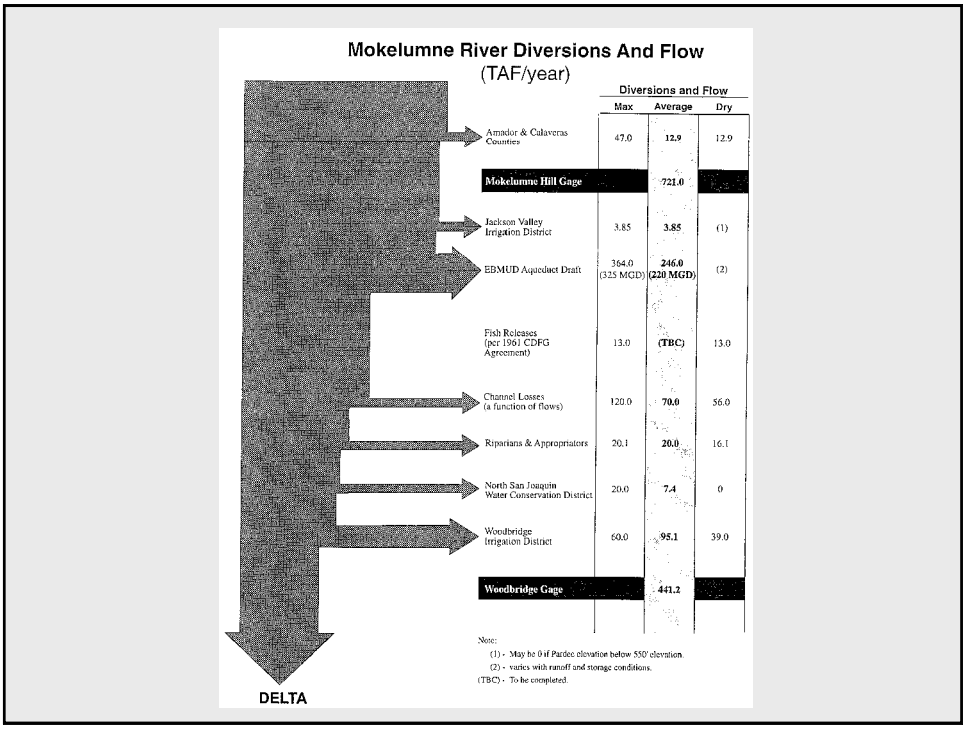
Exhibit 1-1
Major Factors and Assumptions
Affecting the Need for Additional Water

Factor	2020 Assumptions
EBMUD'S Demand for Water in Normal Years[1]	280 TAF (250 MGD)
EBMUD'S Deficiency Rules[2]	25% Limit on Rationing
Future Mokelumne River Runoff / Pardee Inflow[3,4]	130 - 1,595 TAF
Drought Planning Sequence & Related Minimum Storage Criteria[4]	1976, 1977, 185 TAF 40 TAF (Dead Storage)
Operations and Diversions of Other Water Agencies[1,4] Upstream Agencies	32 TAF
Downstream Agencies	59-104 TAF
Annual Mokelumne River Releases for Fisheries[1]	19-114 TAF
Future Amount of Mokelumne River Water Needed to Meet New Bay / Delta Standards[3,4]	? Assumes river releases for fisheries addresses this factor.

NEED FOR ADDITIONAL WATER IN 2020

Notes:
1 Conditions adding to the District's need for water
2 Conditions reducing the District's need for water
3 Conditions which could add to or reduce the District's need for water
4 Conditions largely outside District's control

TAF = thousand acre-feet
MGD = million gallons per day
LMRMP = Lower Mokelumne River Management Plan



Mokelumne River Diversions And Flow
(TAF/year)

	Diversions and Flow Max	Average	Dry
Amador & Calaveras Counties	47.0	12.9	12.9
Mokelumne Hill Gage		721.0	
Jackson Valley Irrigation District	3.85	3.85	(1)
EBMUD Aqueduct Draft	364.0 (325 MGD)	246.0 (220 MGD)	(2)
Fish Releases (per 1961 CDFG Agreement)	13.0	(TBC)	13.0
Channel Losses (a function of flows)	120.0	70.0	56.0
Riparians & Appropriators	20.1	20.0	16.1
North San Joaquin Water Conservation District	20.0	7.4	0
Woodbridge Irrigation District	60.0	95.1	39.0
Woodbridge Gage		441.2	

DELTA

Note:
(1) - May be 0 if Pardee elevation below 550' elevation.
(2) - varies with runoff and storage conditions.
(TBC) - To be completed.

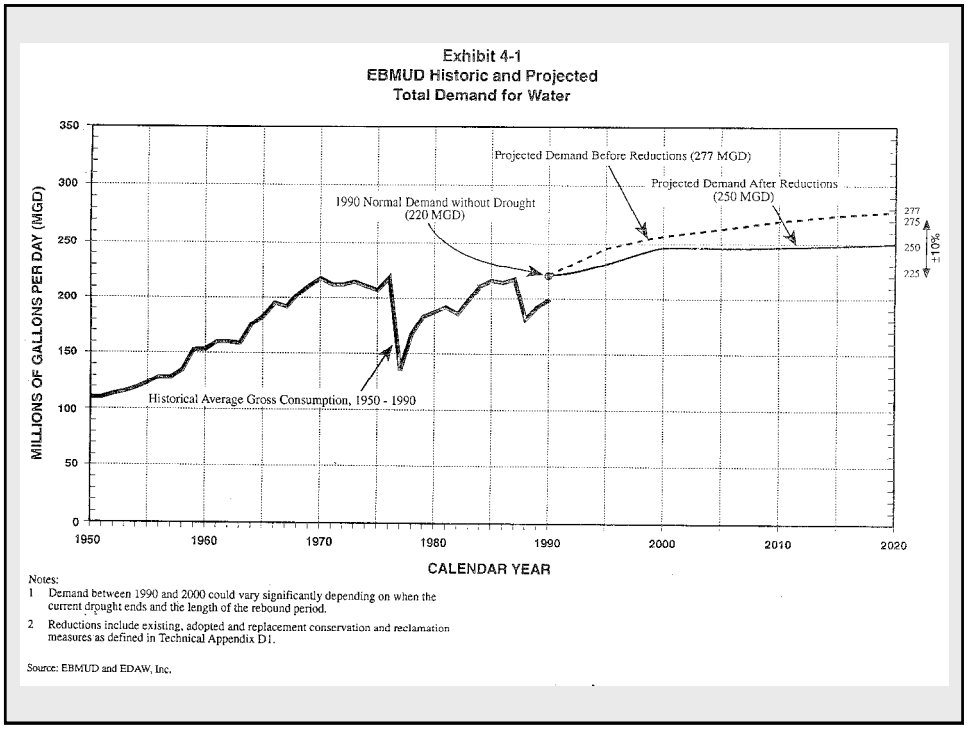


Exhibit 4-1
EBMUD Historic and Projected
Total Demand for Water
MILLIONS OF GALLONS PER DAY (MGD)
CALENDAR YEAR
Projected Demand Before Reductions (277 MGD)
Projected Demand After Reductions
(250 MGD)
1990 Normal Demand without Drought
(220 MGD)
Historical Average Gross Consumption, 1950 - 1990
277
275
250
225
±10%
Notes:
1 Demand between 1990 and 2000 could vary significantly depending on when the current drought ends and the length of the rebound period.
2 Reductions include existing, adopted and replacement conservation and reclamation measures as defined in Technical Appendix D1.
Source: EBMUD and EDAW, Inc.

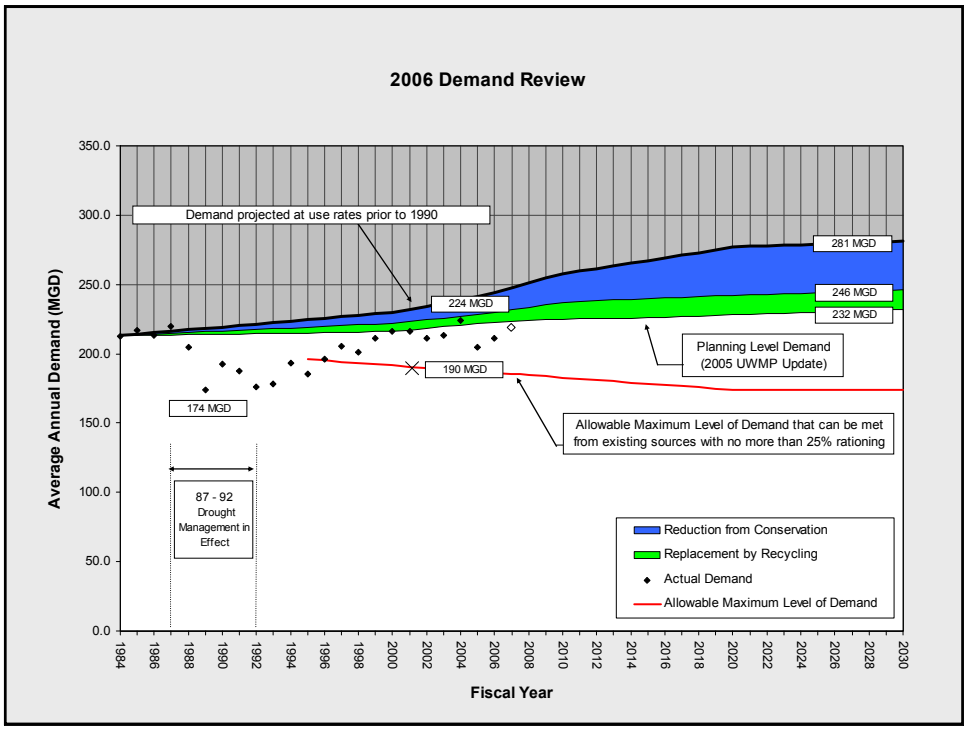

2006 Demand Review
Average Annual Demand (MGD)
Fiscal Year
Demand projected at use rates prior to 1990
224 MGD
281 MGD
246 MGD
232 MGD
190 MGD
174 MGD
Planning Level Demand
(2005 UWMP Update)
Allowable Maximum Level of Demand that can be met from existing sources with no more than 25% rationing
87 - 92
Drought
Management in
Effect
Reduction from Conservation
Replacement by Recycling
Actual Demand
Allowable Maximum Level of Demand

Exhibit 4-17
Drought Planning Sequence Hydrology
Used in EBMUDSIM

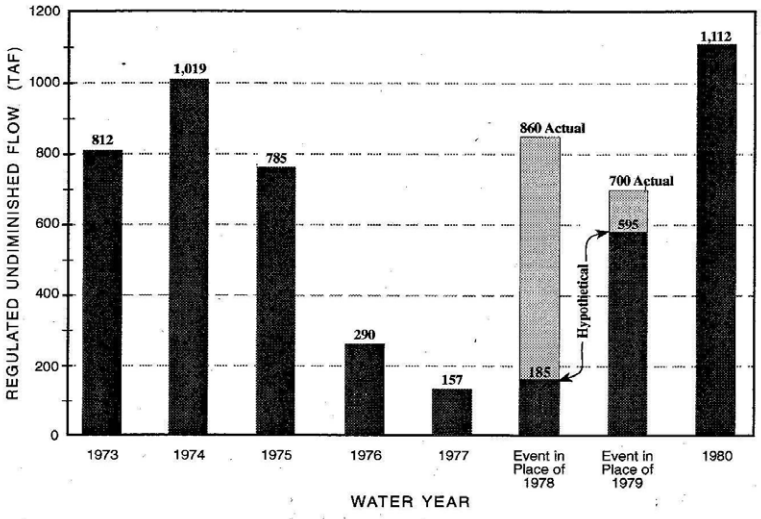
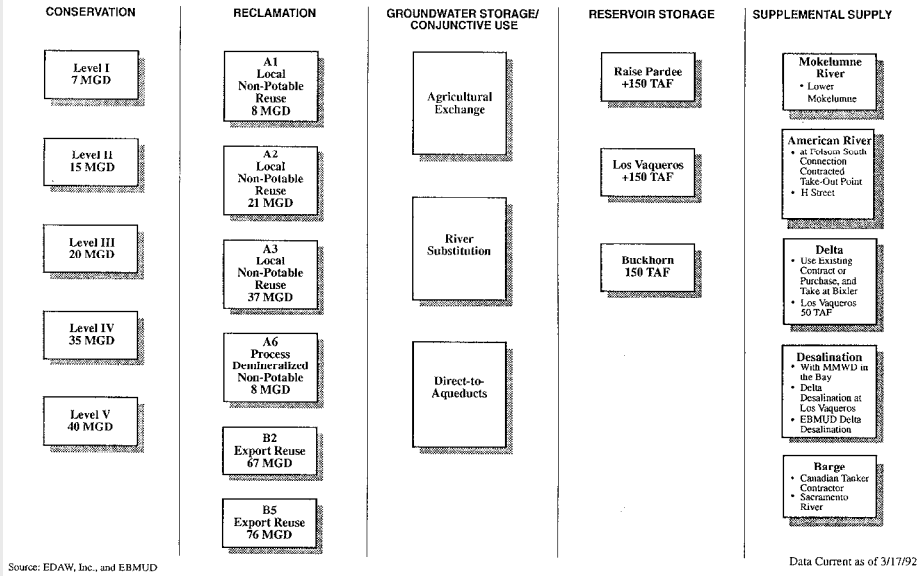
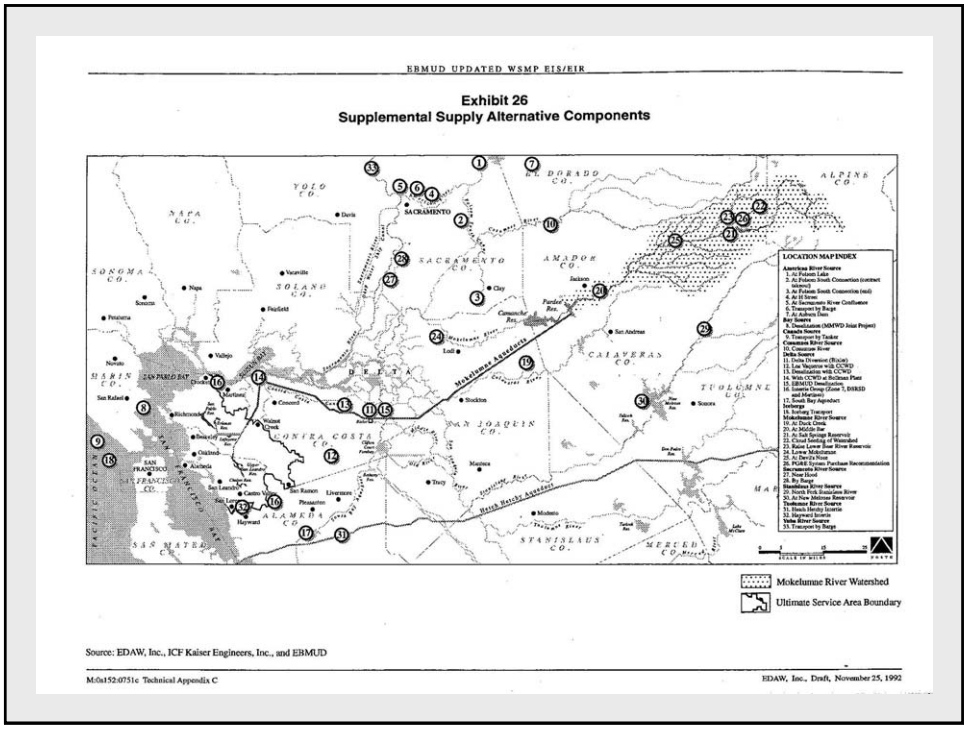


Exhibit 30
Potential Primary Components for Composite Programs





EBMUD UPDATED WSMP EIS/EIR

Exhibit 26
Supplemental Supply Alternative Components

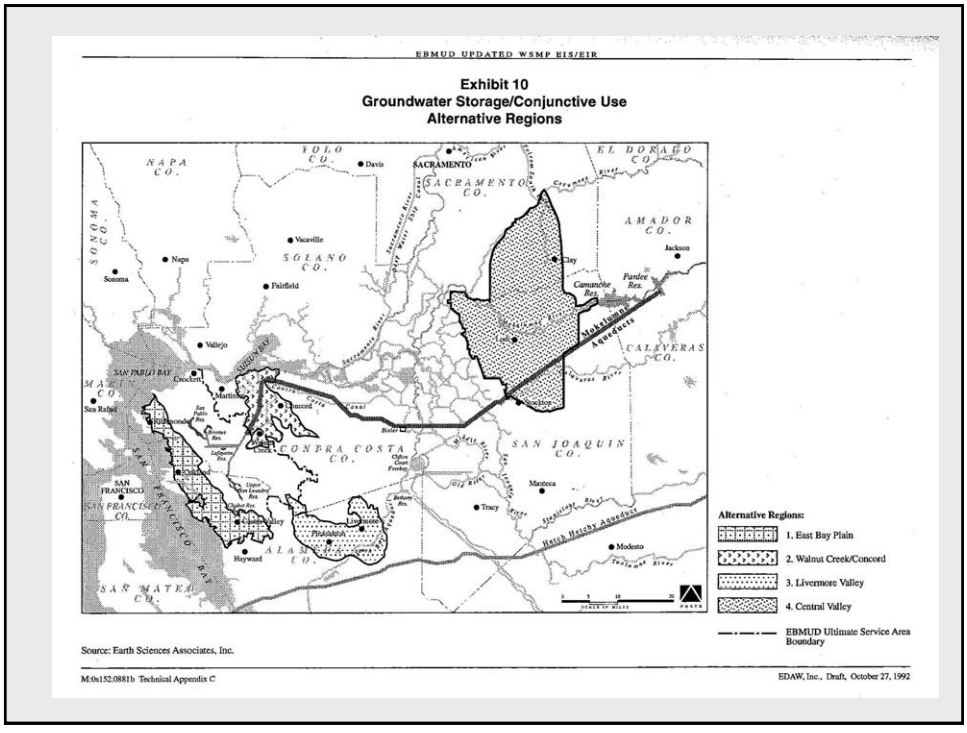
Mokelumne River Watershed

Ultimate Service Area Boundary

Source: EDAW, Inc., ICF Kaiser Engineers, Inc., and EBMUD

M:0s152:0751c Technical Appendix C

EDAW, Inc., Draft, November 25, 1992



EBMUD UPDATED WSMP EIS/EIR

Exhibit 10
Groundwater Storage/Conjunctive Use
Alternative Regions

Alternative Regions:
1. East Bay Plain
2. Walnut Creek/Concord
3. Livermore Valley
4. Central Valley

EBMUD Ultimate Service Area Boundary

Source: Earth Sciences Associates, Inc.

M:0s152:0881b Technical Appendix C

EDAW, Inc., Draft, October 27, 1992

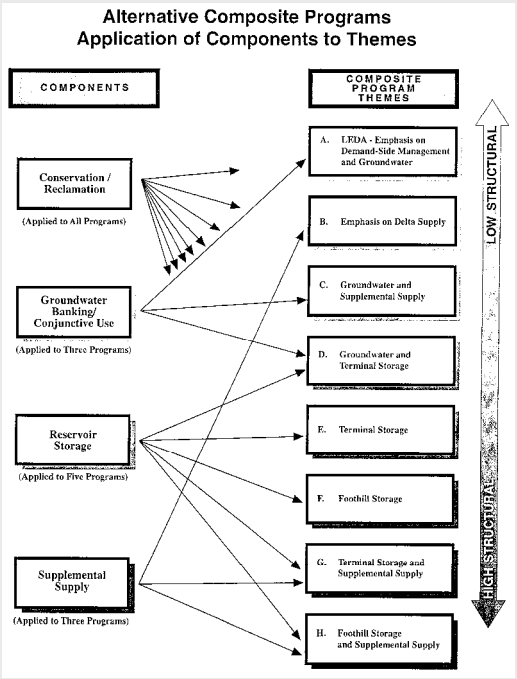


Exhibit 1-2
Primary Composite Programs

PRIMARY COMPOSITE PROGRAMS / COMPONENTS		DMP	CONSERVATION (SAVINGS)[1]		RECLAMATION (SAVINGS)[1]			GROUNDWATER			RESERVOIR	SUPPLEMENTAL SUPPLY		Aqueduct Security	LMRMP	Composite Program Screening Designation[3]
		Maximum Deficiency[2]	II (18 MGD)	IV (35 MGD)	A1 (8 MGD)	A2 (21 MGD)	A6 (8 MGD)	Agricultural Exchange	River Substitution	Direct to Aqueducts	Raise Pardee +150 TAF	Delta	Folsom South Connection			
I	Demand-Side Management	35%		●		●	●							●	●	X
II	Groundwater	25%	●		●			●	●	●				●	●	A'
III	Delta Supply	25%	●		●							●		●	●	B'
IV	Groundwater and Folsom South Connection	25%	●		●			●	●	●			●	●	●	C
V	Raise Pardee	25%	●		●						●			●	●	F
VI	Groundwater Only (Least Cost)	25%						●	●	●				●	●	J

Notes:
1 Savings indicated are in addition to savings from existing and adopted conservation and reclamation programs. Conservation and reclamation savings are not necessarily additive due to overlapping.
2 Drought Management Programs (DMP) are short-term rationing imposed on customers during droughts. A DMP would be implemented in addition to some level of conservation. .
3 During the screening of alternative composite programs, the alternatives were identified by these letters.

Key
● Components included in Primary Composite Programs

Source: EDAW, Inc.

Water Supply Management Program 2040

WSMP 2020 Preferred Program

(Adopted 1993)

Aqueduct Security
An approximate 10-mile section of the Moklelumne Aqueducts through the Sacramento-San Joaquin Delta would be secured against prolonged outages resulting from earthquake-induced failures.

LMRMP
The Lower Mokelumne River Management Plan specifies flow regimes, reservoir operations, and hatchery operations that would enhance benefits to fishery resources in the Mokelumne River while maximizing flexibility in managing a variable water supply, uncertain future demands, and uncertain linkages between fish populations and fishery management activities.

Groundwater Storage/Conjunctive Use
Water would be stored in an underground basin when excess surface water supplies were available and could be withdrawn during drier years when surface supplies were below normal.

Conservation and Reclamation
These two demand-side components would reduce the District's projected 2020 demand for water from 277 MGD to 229 MGD, a reduction of 48 MGD.

Water Supply Management Program 2040

1993 to Present

Aqueduct Security
- Improvements completed (2005)

LMRMP
- FERC JSA signed (1998)

Groundwater Storage/Conjunctive Use
- MARS study (1996)
- Bayside Phase 1 Approved (2005)

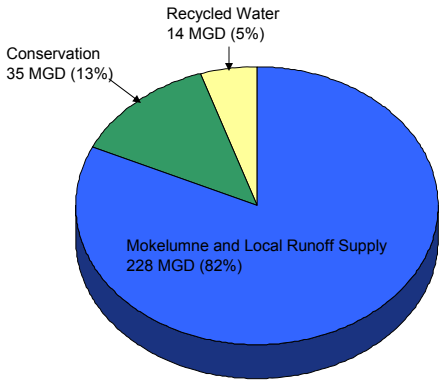
Conservation and Recycling
- Demand Management Advisory Committee (2002)
- Chevron (1996), San Ramon (2006), East Bayshore (2007)

Supplemental Supply
- WSMP Action Plan (1996)
- Freeport JPA (2002)
- Freeport EIR (2004), ROD (2005)
- Long-term CVP Contract renewal (2006)

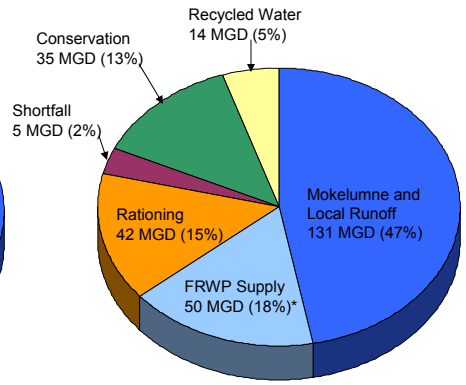
Water Supply Management Program 2040

Projected Water Supply (2020 Demand, 277 MGD)

Normal Year



Three Year Drought – Average Year with FRWP

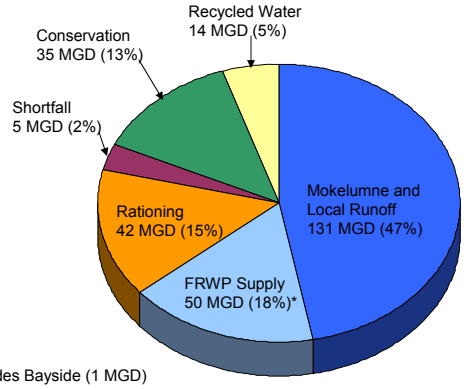


* Includes Bayside (1 MGD)

Water Supply Management Program 2040

Projected Water Supply: 2010 vs 2020

2020
277 MGD Average Daily Demand

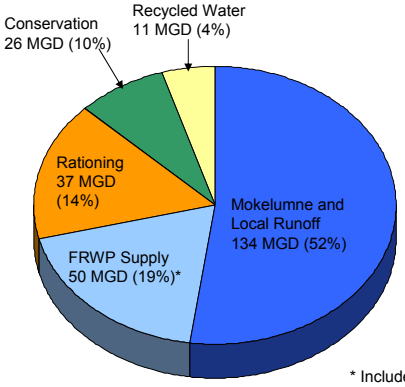


* Includes Bayside (1 MGD)

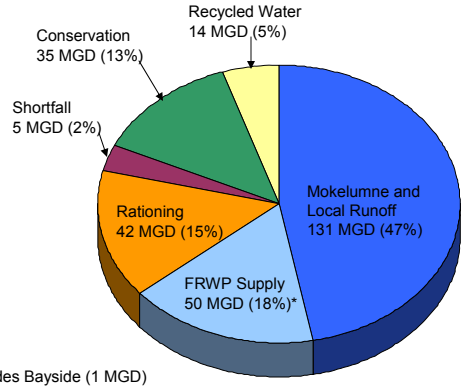
Water Supply Management Program 2040

Projected Water Supply: 2010 vs 2020

2010
258 MGD Average Daily Demand



2020
277 MGD Average Daily Demand



* Includes Bayside (1 MGD)

Water Supply Management Program 2040

WSMP 2040 Purpose

The District is midway through its 1993 WSMP and on schedule to achieve water supply reliability goals for 2020. This creates an excellent opportunity to evaluate new information and update the WSMP for another 20 years.

In doing so, the District will:

1. Account for accomplishments & changes since 1993 WSMP, including:
   - Freeport;
   - Conservation and Recycling;
   - Seismic Improvement Program;
   - Lower Mokelumne JSA;
   - Regional Interties & Forums;
   - New Regulations; and
   - Climate Change.
2. Find optimum balance between conservation, recycled water & supplemental supply.
3. Meet growing need for water.
4. Address increased competition for water.

EBMUD

Policy 3.02

EFFECTIVE 24 SEP 02

SUPERSEDES 23 JAN 06

CALIFORNIA ENVIRONMENTAL QUALITY ACT IMPLEMENTATION

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Adopt and comply with the objectives and criteria of the California Environmental Quality Act (CEQA) and CEQA Guidelines, as they are from time to time amended, and develop procedures that are consistent with District implementation of the Guidelines.

EBMUD

Policy 3.05

EFFECTIVE 14 NOV 06

SUPERSEDES 13 FEB 01

CONSIDERATIONS FOR EXTENSION OF WATER BEYOND THE ULTIMATE SERVICE BOUNDARY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT THAT:

The District will not extend water to areas outside the present Ultimate Service Boundary (USB) of the District, if such extension would result in:

1. A reduction in the quantity of water available to District customers to satisfy existing or projected levels of demand; or
2. A reduction in the quality of water available to the District customers from the District's present water sources; or
3. An increase in costs of service for District customers.

The USB defines the territory within which the District has planned to provide water service. The phrase "District customers" as used in this policy shall mean (i) existing water service customers of the District and (ii) future customers, located within the present USB, but not now receiving water service.

This policy shall not apply to proposed annexations of property to the District's service area within the USB and such annexation shall continue to be evaluated on a case by case basis.

EBMUD

Policy 3.07

EFFECTIVE 27 JUN 06

SUPERSEDES 28 SEP 04

RESPONSIBILITY TO SERVE WATER CUSTOMERS

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Ensure that during times of water shortage, available water supplies are appropriately allocated to water customers.

EBMUD

Policy 4.13

EFFECTIVE 25 JUL 06

SUPERSEDES 25 JUN 96

RATE SETTING GUIDELINES FOR WATER RATES

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT THAT:

A water rate structure that provides adequate revenues through affordable rates, encourages conservation and efficient use of water, and reflects the cost to serve customers will enhance the District's ability to provide a safe, reliable, adequate water supply to its customers over the long term.

EBMUD

Policy 6.01

EFFECTIVE 27 SEP 05

SUPERSEDES 08 JUL 03

BAY/DELTA PROTECTION

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Support the protection and enhancement of the Sacramento-San Joaquin Delta and San Francisco Bay estuary and their tributaries, including ecosystem enhancements, water quality improvement and optimized water management; support balanced implementation of the CALFED Bay-Delta Program; support the development of science based water quality standards that place a high priority on protecting the quality of drinking water supplies, consistent with the District's statutory obligations and responsibilities to those who use its water, wastewater, and other services.

EBMUD

Policy 7.05

EFFECTIVE 22 SEP 98

SUPERSEDES 13 SEP 94

ENVIRONMENTAL RESPONSIBILITY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Provide reliable, high-quality drinking water and wastewater service with operational, maintenance and construction activities that avoid, minimize or mitigate adverse environmental effects to the maximum extent feasible.

EBMUD

Policy 7.10

EFFECTIVE 25 JUL 06

SUPERSEDES 08 JUN 04

SOURCE WATER QUALITY

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Protect the public health of its customers by serving high quality water from the best available source in preference to reliance on additional treatment.

EBMUD

Policy 8.01

EFFECTIVE 14 NOV 06

SUPERSEDES 28 SEP 04

NON-POTABLE WATER

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Require that customers of the East Bay Municipal Utility District ("EBMUD") use non-potable water, including recycled water, for non-domestic purposes when it is of adequate quality and quantity, available at reasonable cost, not detrimental to public health and not injurious to plant life, fish and wildlife. When nonpotable water satisfying these conditions is made available to the customer, the use of potable water for nondomestic purposes may constitute a waste and unreasonable use of water within the meaning of Section 2 of Article X of the California Constitution and is prohibited.

EBMUD

Policy 9.03

EFFECTIVE 09 NOV 99

SUPERSEDES 09 MAY 89

WATER SUPPLY AVAILABILITY AND DEFICIENCY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Evaluate the availability of the District's water supplies (supplies of the same or similar quality to that of the Mokelumne River supply) and determine the acceptable maximum level of average annual demand for the District's service area based on limiting the water supply deficiency to a maximum of 25% during an occurrence of the drought planning sequence described in the Final Environmental Impact Report for the Updated Water Supply Management Program, September 1993.

EBMUD

Policy 9.04

EFFECTIVE 13 FEB 01

SUPERSEDES 11 AUG 98

WATERSHED MANAGEMENT AND USE

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Acquire, protect, and manage watershed land surrounding District reservoirs, in a manner which assures the District's water supply is maintained. Also, to ensure that watershed lands are maintained in accordance with the District's primary objective of providing high quality drinking water and managed in accordance with District environmental principles.

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional
- Provide water supply reliability.
- Preserve current water right entitlements.
- Promote District involvement in regional, sustainable solutions.

Economic
- Minimize cost to District customers.
- Minimize drought impact to District customers.

Public Health, Safety & Community
- Protect the high quality of the District's water supply.
- Minimize adverse sociocultural impacts (including environmental justice).
- Minimize risks to public health & safety.
- Maximize security of infrastructure & water supply.

Environmental
- Preserve & protect the environment for future generations.
- Preserve & protect biological resources.
- Contribute to reduction in carbon footprint.
- Provide appropriate recreational opportunities.

Water Supply Management Program 2040

Workshop Schedule

Board Guidance & Input

Workshop #1	**April 24, 2007**	**WSMP 2040 Objectives**
Workshop #2	June 26, 2007	Demand Study Progress Preliminary 2040 Demand Drought Planning Sequence
Workshop #3	July 24, 2007	Range of Components
Workshop #4	September 25, 2007	Conservation, Recycling, Rationing
Workshop #5	November 27, 2007	Economic Modeling & Risk Assessment Global Climate Change Implications
Workshop #6	February 26, 2008	2040/2060 Demand Projections Screening Criteria Component Screening & Evaluation
Workshop #7	April 22, 2008	Portfolio Screening & Evaluation
Workshop #8	June 24, 2008	Identify Preferred Portfolio
Workshop #9	November 25, 2008	Adopt WSMP & Certify EIR

May 1, 2007

Water Supply Management Program 2040

Community Liaison Committee
Meeting #2

July 10, 2007

1

Water Supply Management Program 2040

Agenda

1. Welcome and Introductions
2. Review Progress to Date
3. Demand Study: Progress Report
4. Land Use Map Demonstration
5. Drought Planning Sequence
6. Evaluation Criteria Approach
7. Other Comments and Questions
8. Public Comments
9. Next Community Liaison Committee Meeting: September 11, 2007

2

Water Supply Management Program 2040

WSMP 2040 Purpose

The District is midway through its 1993 WSMP and on schedule to achieve water supply reliability goals for 2020. This creates an excellent opportunity to evaluate new information and update the WSMP for another 20 years.

In doing so, the District will:

1. Account for accomplishments & changes since 1993 WSMP, including:
   - Freeport;
   - Conservation and Recycling;
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   - Lower Mokelumne JSA;
   - Regional Interties & Forums;
   - New Regulations; and
   - Climate Change.
2. Find optimum balance between conservation, recycled water & supplemental supply.
3. Meet growing need for water.
4. Address increased competition for water.

3

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

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Preserve current water right entitlements.
Promote District involvement in regional, sustainable solutions.

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Minimize drought impact to District customers.

Public Health, Safety & Community

Ensure the high quality of the District's water supply.
Minimize adverse sociocultural impacts (including environmental justice).
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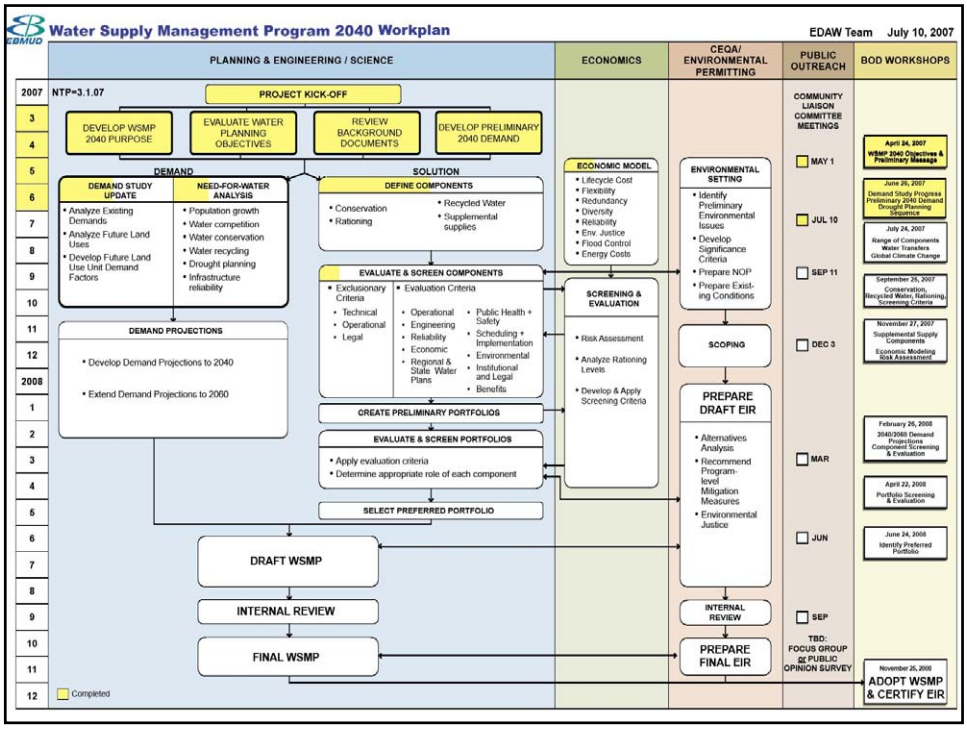
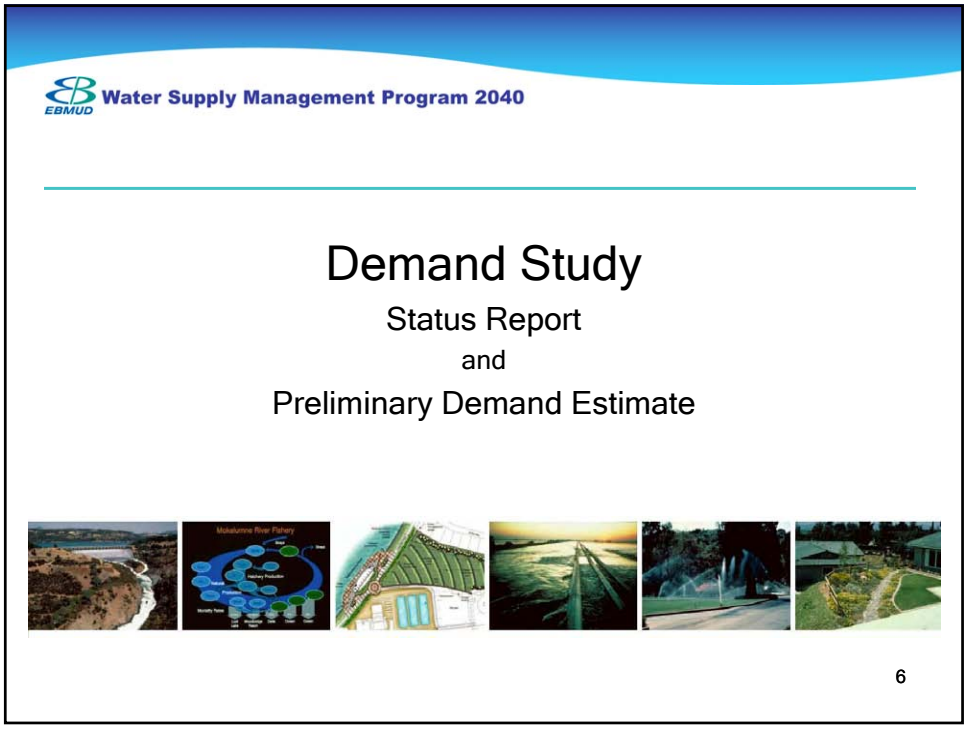
Maximize security of infrastructure & water supply.

Environmental

Preserve & protect the environment for future generations.
Preserve & protect biological resources.
Contribute to reduction in carbon footprint.
Promote recreational opportunities.

4


Water Supply Management Program 2040 Workplan
EDAW Team July 10, 2007
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
NTP=3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP PRELIMINARY 2040 DEMAND
DEMAND
SOLUTION
DEMAND STUDY UPDATE
NEED-FOR-WATER ANALYSIS
DEFINE COMPONENTS
EVALUATE & SCREEN COMPONENTS
DEMAND PROJECTIONS
CREATE PRELIMINARY PORTFOLIOS
EVALUATE & SCREEN PORTFOLIOS
SELECT PREFERRED PORTFOLIO
DRAFT WSMP
INTERNAL REVIEW
FINAL WSMP
ECONOMIC MODEL
SCREENING & EVALUATION
ENVIRONMENTAL SETTING
SCOPING
PREPARE DRAFT EIR
INTERNAL REVIEW
PREPARE FINAL EIR
COMMUNITY LIAISON COMMITTEE MEETINGS
MAY 1
JUL 10
SEP 11
DEC 3
MAR
JUN
SEP
TBD: FOCUS GROUP or PUBLIC OPINION SURVEY
ADOPT WSMP & CERTIFY EIR
Completed


Water Supply Management Program 2040
Demand Study
Status Report
and
Preliminary Demand Estimate
6

Water Supply Management Program 2040

Agenda

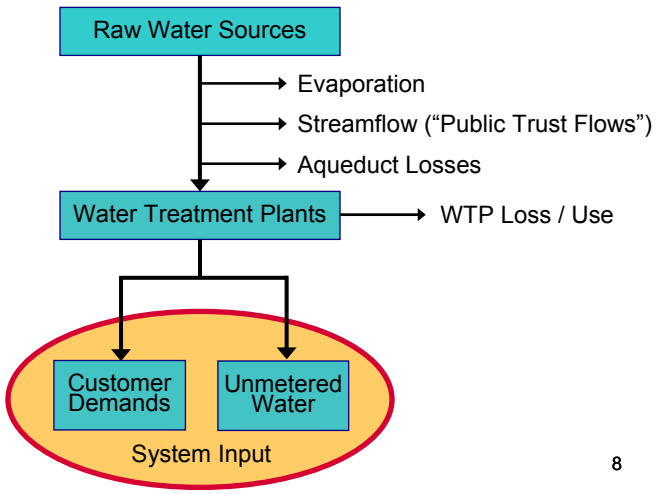
- Baseline for Demands
- Demand Estimating Methodology
- Preliminary Demand Estimate
- Demand Study Status

7

Water Supply Management Program 2040

Determine Baseline for Demands

2005 Base Year



8

Water Supply Management Program 2040

Land Use Methodology Provides Most Value to District

	Land Use Method	Population Method	Socio-economic Method
Uses spatial data	✓		
Based on General Plans	✓		
Accounts for non-residential consumption	✓		✓
Assumptions undergone CEQA	✓		
Allows for disaggregation of data	✓		
Transparent methodology	✓	✓	
Data is readily available		✓	
Commonly used		✓	

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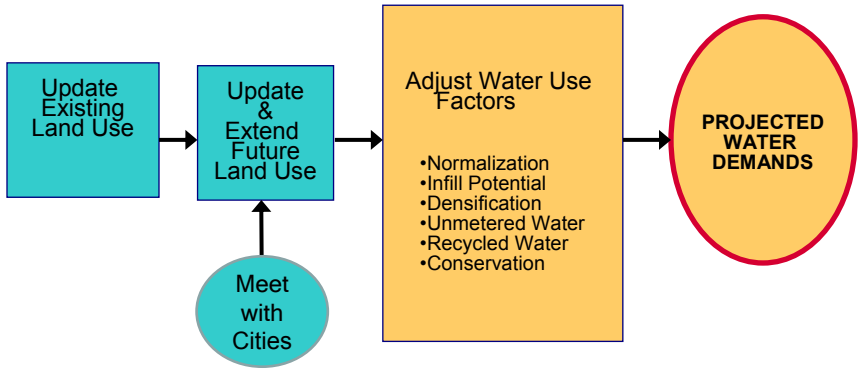
Water Supply Management Program 2040

Land Use Method



10

Water Supply Management Program 2040

Meetings with Planning Agencies

Contra Costa County Land Use Planning Agencies

Contra Costa County
City of El Cerrito
City of Hercules
City of Pinole
City of Richmond
City of San Pablo
City of Danville
City of Lafayette
City of Moraga
City of Orinda
City of San Ramon
City of Walnut Creek

Alameda County Land Use Planning Agencies

Alameda County
City of Alameda
City of Albany
City of Berkeley
City of Emeryville
City of Oakland
City of Piedmont
City of San Leandro

11

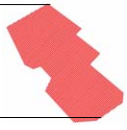
Water Supply Management Program 2040

Update Existing Land Use (2005)

Example of Use Factor:

4.9 acres x 655 gallons/day =

134 gpd/ac



- Orthographic photos (2005)
- 7,200 land use polygons in database
- Use customer metered consumption

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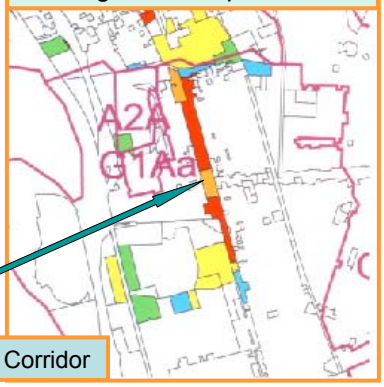
Water Supply Management Program 2040

Update & Extend Future Land Use (2040)

- Infill potential for vacant parcels
- Densification
- Timing of development



San Pablo Ave. Corridor

Water Supply Management Program 2040

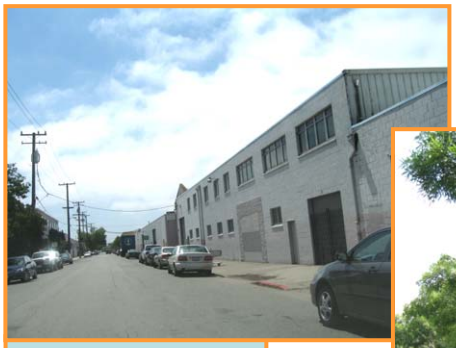
Adjust Water Use Factors

- Higher Densities
- Normalization
- Unmetered Water
- Recycled Water
- Conservation

Higher densities in the future
= Higher consumption per acre

Water Supply Management Program 2040

Adjust Water Use Factors



Underutilized Lands – Low Consumption

Higher Consumption with New Uses

Water Supply Management Program 2040

Preliminary Demand Estimate

- Used in development of portfolios
- 2005 normalized demand = 218 MGD
- 2040 demand range = 246 MGD to 270 MGD
  - 246 MGD = same level & type of development as determined in 1996
  - 270 MGD = increased level of density & development

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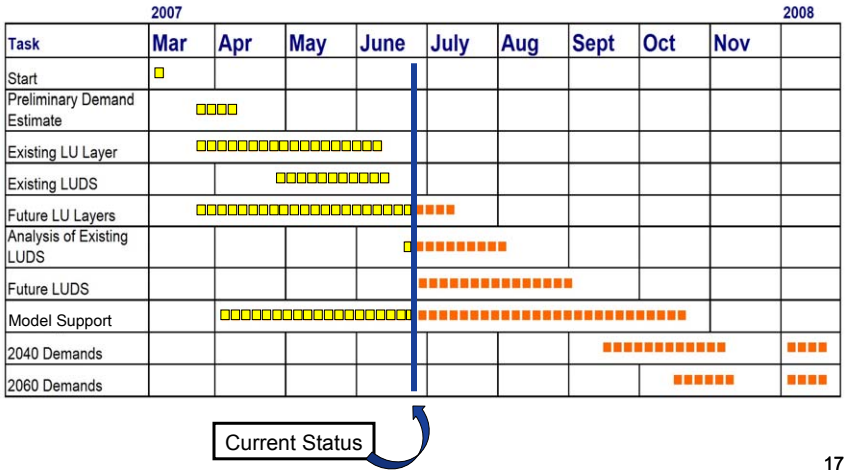
Water Supply Management Program 2040

Demand Study Status



Water Supply Management Program 2040

Land Use Map Demonstration

(video flythrough)

EBMUD Water Supply Management Program 2040

Drought Planning Sequence
Evaluation

Water Supply Management Program 2040

Approach

- Review District's current drought planning sequence
- Review methods including tree-ring analysis and stochastic assessment
- Review methods from other water districts
- Assess carryover storage with 2040 demands

21

Water Supply Management Program 2040

Background

- Existing Drought Planning Sequence (DPS) reflects the District's experience during 1976-77 drought
- 3-Year sequence: WY1978 runoff is replaced with average annual runoff from 1976-1977 (approx. 185 TAF)

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Water Supply Management Program 2040

Background

- Provides safeguard against the possibility of dry conditions continuing for a third year
- Carry-over storage fully depleted by the end of the third drought year, none held back as carry-over for a fourth dry year

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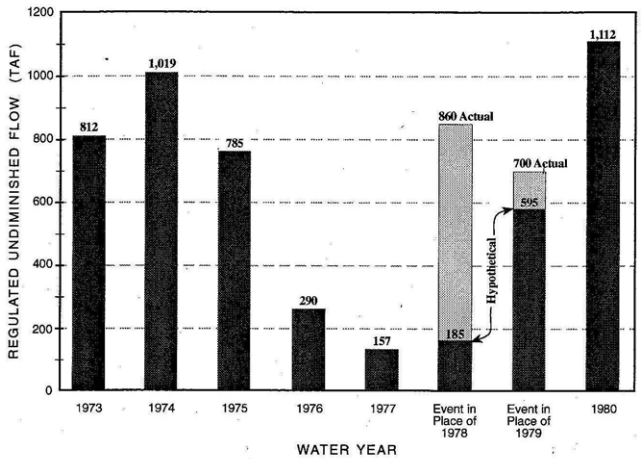
Water Supply Management Program 2040

EBMUD Current DPS

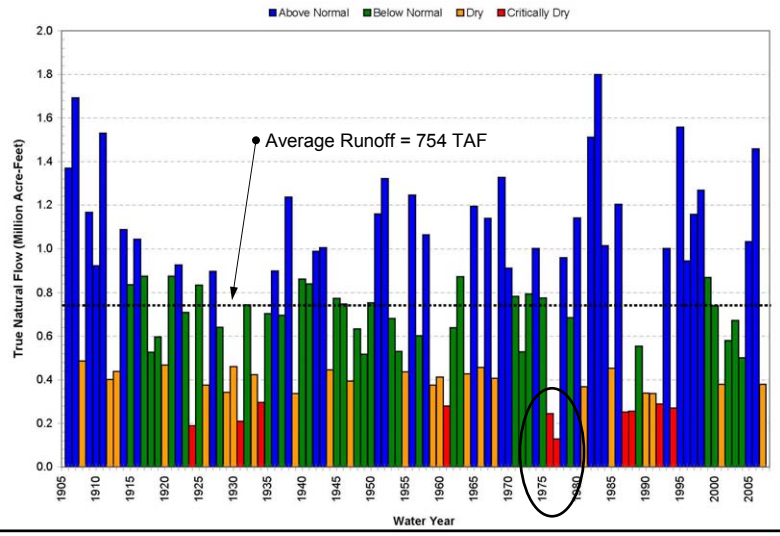


Source: Updated Water Supply Management Program, EDAW, 1993.

24

Water Supply Management Program 2040

Mokelumne River Runoff (1906-2007)



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Water Supply Management Program 2040

Comparison of Drought Planning Approaches

Agency	Basis for Drought Planning Sequence	Drought Management Triggers
EBMUD	1976-1978 (simulated 1978 = average of 76/77)	Prepare Drought Management Plan when storage is projected to be less than 500 TAF.
SCVWD	1987-1992 drought extended to a 10-year duration	Groundwater end-of-the-year carryover storage less than 350,000 af
SFPUC	1986-92 drought	No exact triggers.
CCWD	Variety of drought years and scenarios considered	No exact triggers.
Alameda CWD	IRMP model based on the period of record (1922-1992).	No triggers given.
MWD	1990-1992 drought Single dry year scenario is based on 1977	No specific triggers.
San Diego CWA	1990-1992 drought	No triggers given.
LA DWP	1959-61 drought	No triggers given.

Source: Comparison of Major Municipal and Industrial Water Agency Drought Planning Approaches, CH2MHill, 2002.

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Water Supply Management Program 2040

DPS Analyses

Tree rings

- Studies ongoing in California
- Provide historical data that pre-dates instrumentation.
- 37 datasets near Mokelumne Basin, closest are Yosemite National Park
- Two reconstructions in Sacramento Basin since 2000; none for Mokelumne Basin

Stochastic (Probabilistic) Modeling

- Use probabilistic techniques to characterize hydrology close to historical flows
- Mokelumne River flows have a short historical record
- Insufficient to capture full extent of climatic variations

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Water Supply Management Program 2040

DPS Analyses

Analysis of EBMUD data

- 1907 to 1975: 1,000-year return period for 3-year drought
- 1907 to 1987: 200-year return period for 3-year drought
- 1907 to 2007: 100-year return period for 3-year drought

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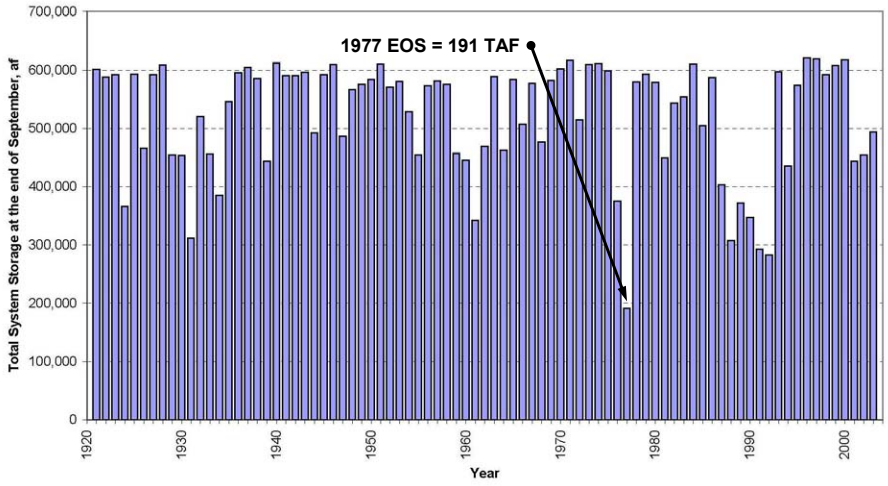
Water Supply Management Program 2040

Simulated Carryover Storage

Demand = 258 MGD, with Freeport Supply



Water Supply Management Program 2040

Recommendation

Continue with existing drought planning sequence: 1976/1977 with simulated 1978

EBMUD Water Supply Management Program 2040

Evaluation Criteria

Approach

31

EBMUD Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional
- Provide water supply reliability.
- Preserve current water right entitlements.
- Promote District involvement in regional, sustainable solutions.

Economic
- Minimize cost to District customers.
- Minimize drought impact to District customers.

Public Health, Safety & Community
- Ensure the high quality of the District's water supply.
- Minimize adverse sociocultural impacts (including environmental justice).
- Minimize risks to public health & safety.
- Maximize security of infrastructure & water supply.

Environmental
- Preserve & protect the environment for future generations.
- Preserve & protect biological resources.
- Contribute to reduction in carbon footprint.
- Promote recreational opportunities.

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

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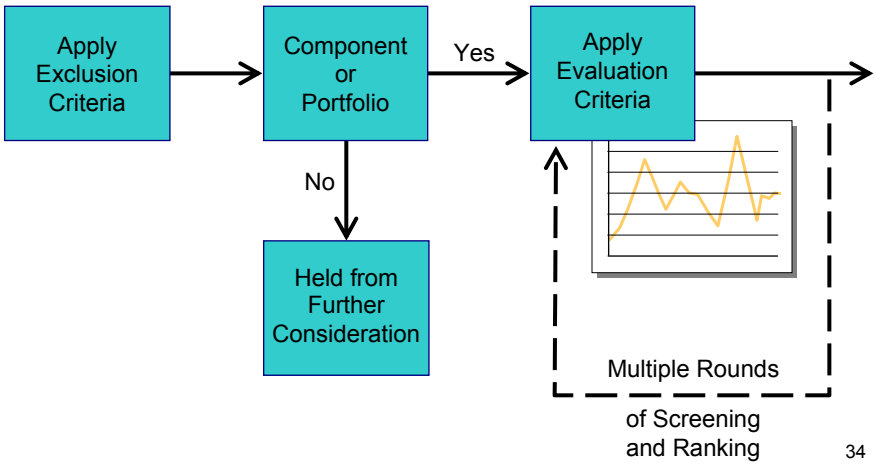
Water Supply Management Program 2040

Screening Process



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Water Supply Management Program 2040

Exclusionary Criteria

Program components must. . .

1. Be technically feasible.
2. Not create geologic, hydrologic or toxic/hazardous material hazards.
3. Be logistically feasible - legally and institutionally. (Must meet water rights and dam/reservoir permit and license conditions.)
4. Provide reliability during Drought Planning Sequence.

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Water Supply Management Program 2040

Evaluation Criteria

1. Minimize risk of disruptions in service.
2. Maximize operational flexibility to respond to changes in water demands.
3. Maximize implementation flexibility (e.g., phasing of components as demands and needs change).

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Water Supply Management Program 2040

Evaluation Criteria

4. Minimize logistical problems (legal and institutional).

5. Minimize rationing due to drought.

6. Facilitate involvement in regional solutions (e.g., desalination, interties).

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Water Supply Management Program 2040

Other Comments and Questions

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EBMUD Water Supply Management Program 2040

Public Comment Period

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EBMUD Water Supply Management Program 2040

Next CLC Meeting
September 11, 2007

40

EBMUD Water Supply Management Program 2040

Community Liaison Committee
Third Meeting
September 11, 2007

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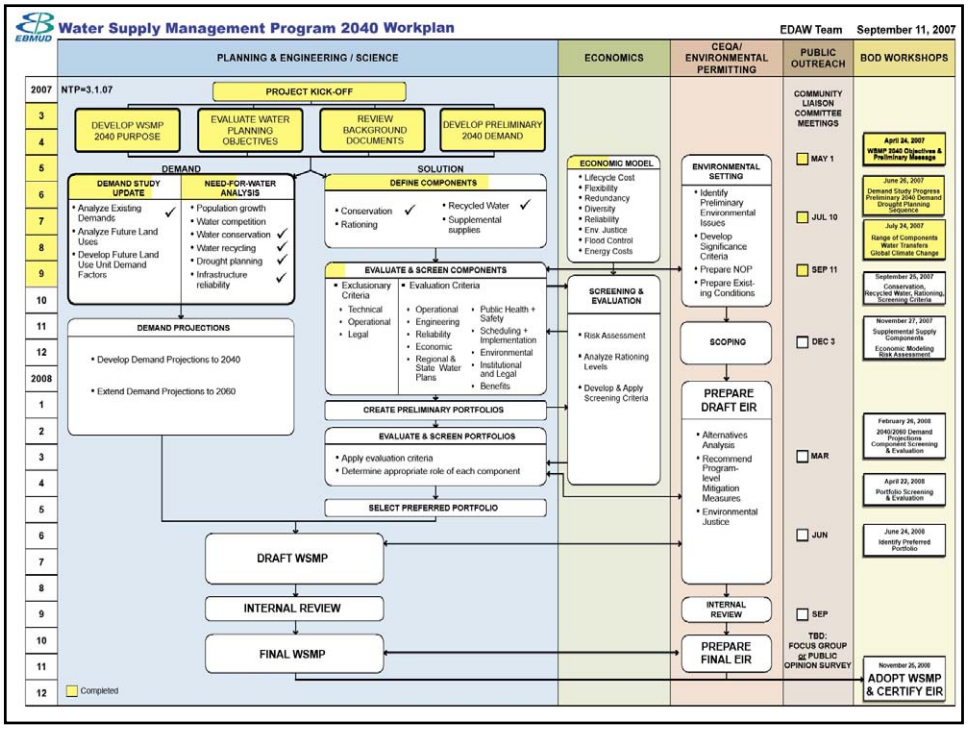

Water Supply Management Program 2040

Water Transfers

Overview

Water Supply Management Program 2040

Today

1. Why are water transfers a consideration for EBMUD?
2. Water Transfer Basics
3. Examples
4. Potential Opportunities for EBMUD
5. Next Steps

Water Supply Management Program 2040

Why consider water transfers?

1. Innovative approach for optimizing water resources & infrastructure
2. Urban & Environmental water demand projected to increase statewide
3. Freeport facility provides unique opportunity – existing infrastructure for conveyance

Water Supply Management Program 2040

Primary Mechanisms

- Direct Diversion
  - From surface water, then conveyed into delivery & treatment system
- Storage
  - Groundwater banking, stored for later use
- In-Lieu Use/Exchange
  - Groundwater used instead of surface water
  - "Paper" transfer

Water Supply Management Program 2040

Types of Water Transfers

1. Temporary
   - One year or less
   - Most common
   - Minimal CEQA & regulatory review
   - Lowest long-term reliability
2. Long-term
   - Greater than one year
   - Complex, highly detailed, may require extensive environmental review
   - More reliable
3. Outright Sale / Assignment of Water Right
   - Permanent, give up water right
   - Most reliable

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Water Supply Management Program 2040

Examples of Water Transfers
How is it done?

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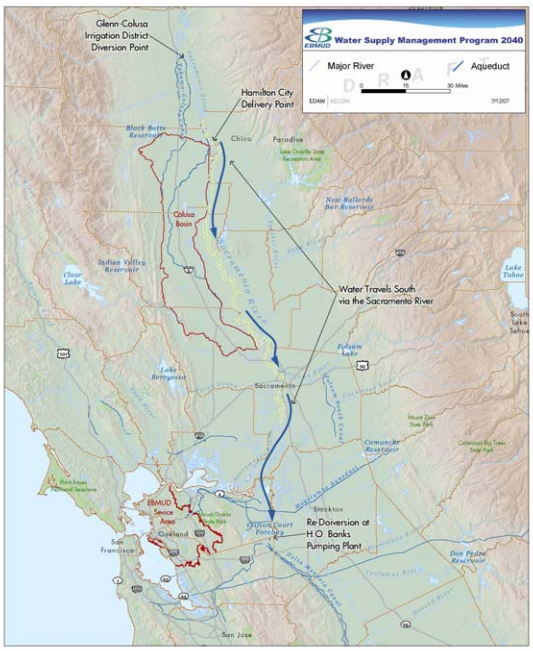
Glenn-Colusa Irrigation District Water Transfer to Metropolitan Water District (and others)



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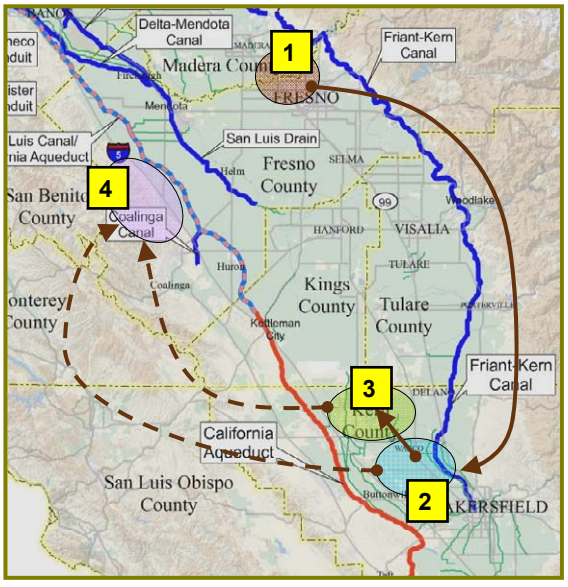
Madera Irrigation District

LEGEND

Water Transfer Mode

- = via CVP exchange
- = via direct delivery

1	= MID
2	= NKWSD
3	= Semitropic
4	= WWD



Water Supply Management Program 2040

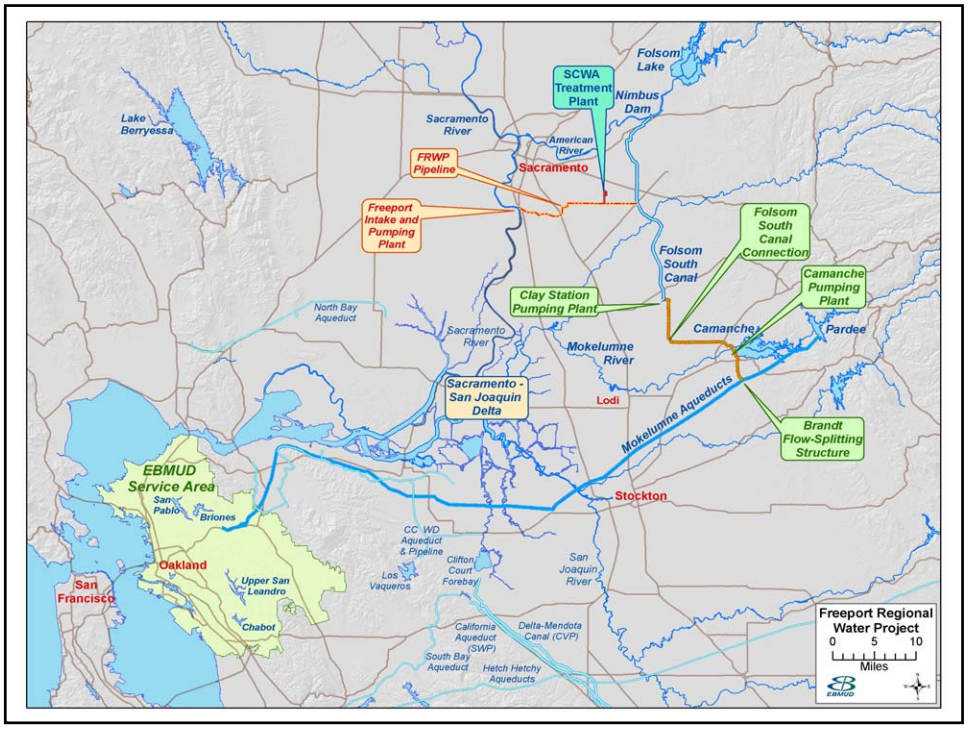
Potential Roles for EBMUD

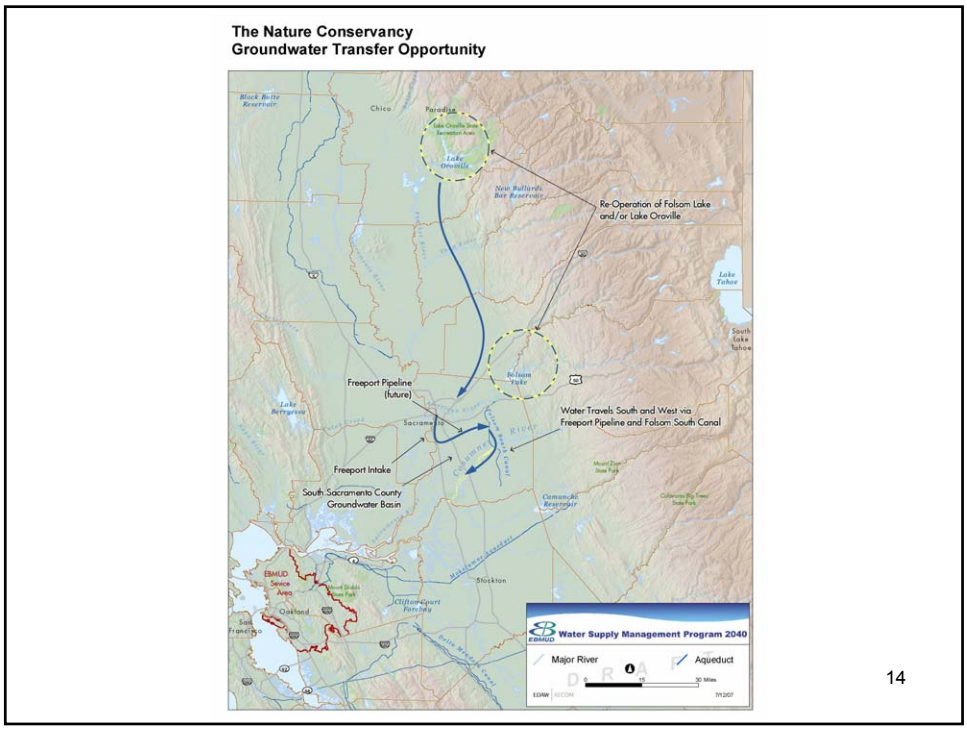
1. Buyer
2. Utilize EBMUD facilities for conveyance
3. Receive money or water for use of conveyance

Water Supply Management Program 2040

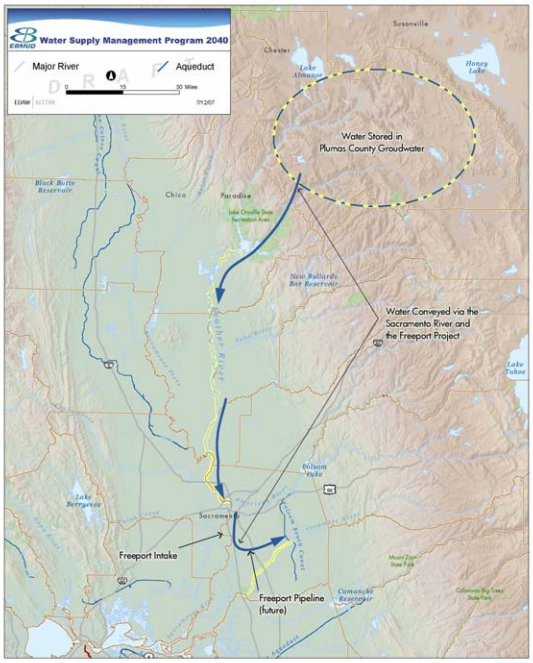
Potential Water Transfer Partners

1. Contra Costa Water District
2. Santa Clara Valley Water District
3. San Francisco Public Utilities Commission
4. Alameda County Water Agency
5. Zone 7 Water Agency
6. City of Lodi
7. Amador Water Agency
8. Woodbridge Irrigation District
9. Glen-Colusa Irrigation District
10. Plumas County
11. City of Folsom
12. Calaveras County Water District
13. Butte County
14. Yuba County
15. Byron-Bethany Irrigation District
16. Individual Agricultural Users


Folsom Lake
SCWA Treatment Plant
Nimbus Dam
Lake Berryessa
Sacramento River
American River
FRWP Pipeline
Sacramento
Freeport Intake and Pumping Plant
Folsom South Canal Connection
Folsom South Canal
Camanche Pumping Plant
Clay Station Pumping Plant
North Bay Aqueduct
Sacramento River
Camanche
Pardee
Mokelumne River
Sacramento - San Joaquin Delta
Lodi
Mokelumne Aqueducts
Brandt Flow-Splitting Structure
EBMUD Service Area
San Pablo
Briones
Stockton
CC WD Aqueduct & Pipeline
Clifton Court Forebay
San Joaquin River
Oakland
San Francisco
Upper San Leandro
Los Vaqueros
Chabot
California Aqueduct (SWP)
Delta-Mendota Canal (CVP)
South Bay Aqueduct
Hetch Hetchy Aqueducts
Freeport Regional Water Project
0 5 10
Miles


The Nature Conservancy
Groundwater Transfer Opportunity
Re-Operation of Folsom Lake and/or Lake Oroville
Freeport Pipeline (future)
Water Travels South and West via Freeport Pipeline and Folsom South Canal
Freeport Intake
South Sacramento County Groundwater Basin
Water Supply Management Program 2040
Major River
Aqueduct
14

Plumas County Transfer Opportunity



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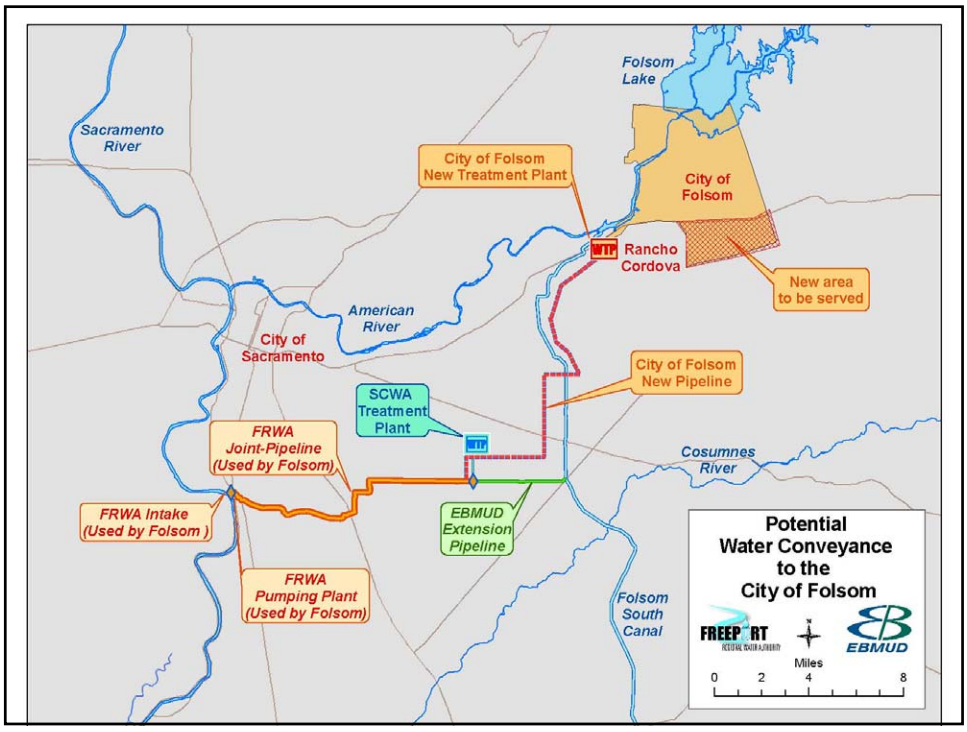


Water Supply Management Program 2040

Why consider water transfers?

1. Innovative approach for optimizing water resources & infrastructure
2. Urban & Environmental water demand projected to increase statewide
3. Freeport facility provides unique opportunity – existing infrastructure for conveyance

Water Supply Management Program 2040

Range of Components

Water Supply Management Program 2040

Components

1. Supplemental Supply
2. Conservation Goals & Programs
3. Recycled Water Projects

Water Supply Management Program 2040

Criteria for Initial List of Components

1. Passed WSMP 2020 early screening
2. Passed Freeport early screening
3. Actively under consideration by District
4. Projects now viable due to Freeport

Water Supply Management Program 2040

Supplemental Supply

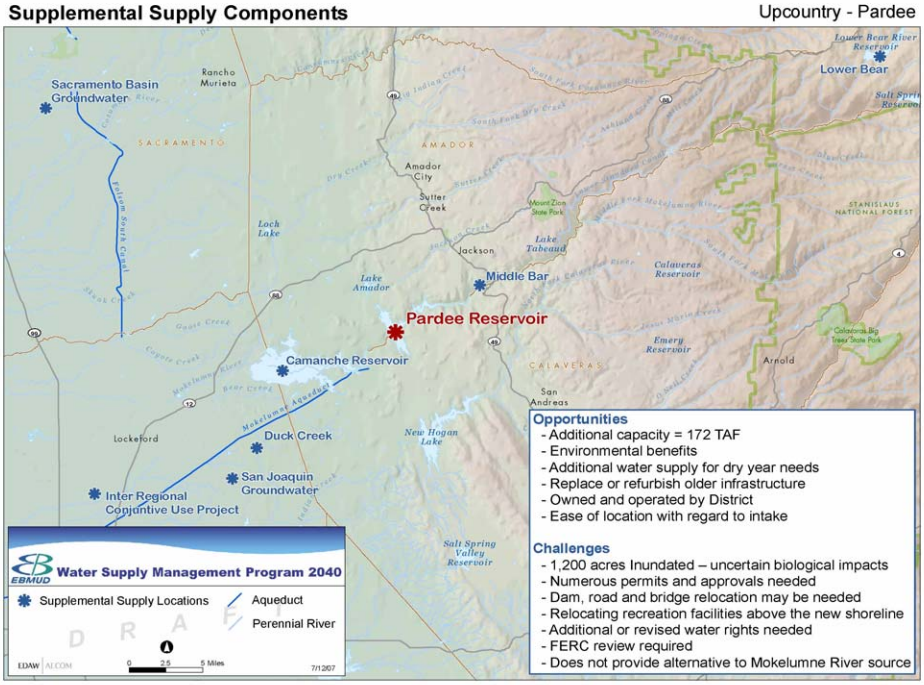
Statewide (CALFED)
1. Raise Shasta Reservoir
2. Temperance Flat
3. SITES Reservoir
4. Expanded Los Vaqueros

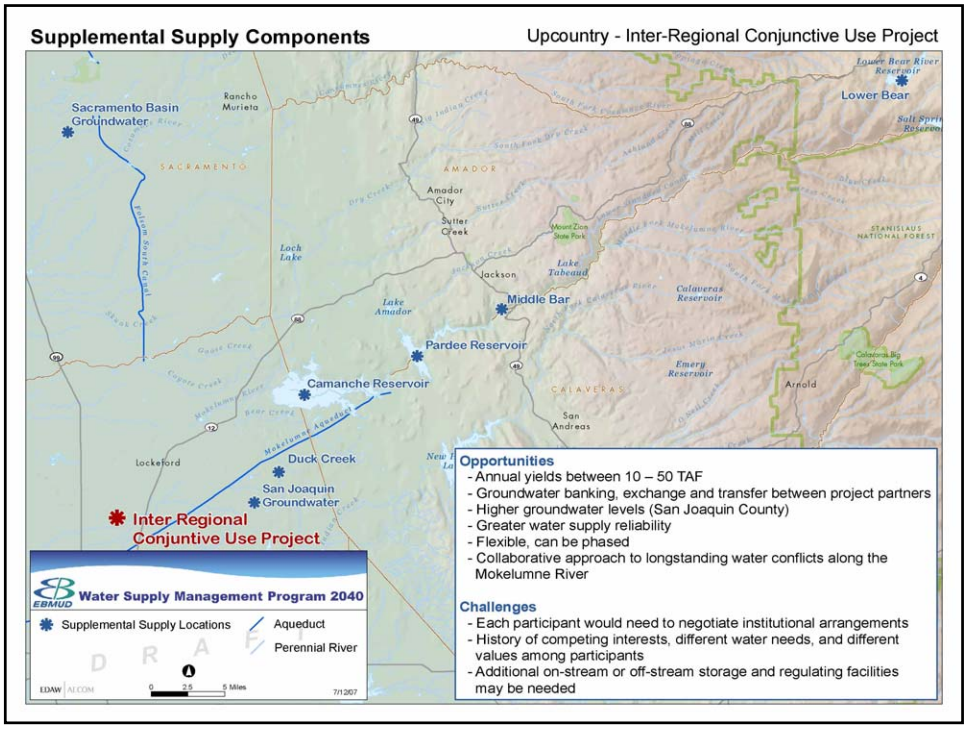
Upcountry
1. Pardee
2. Camanche
3. Lower Bear
4. Middle Bar
5. Inter-Regional Conjunctive Use Project
6. Water Transfers

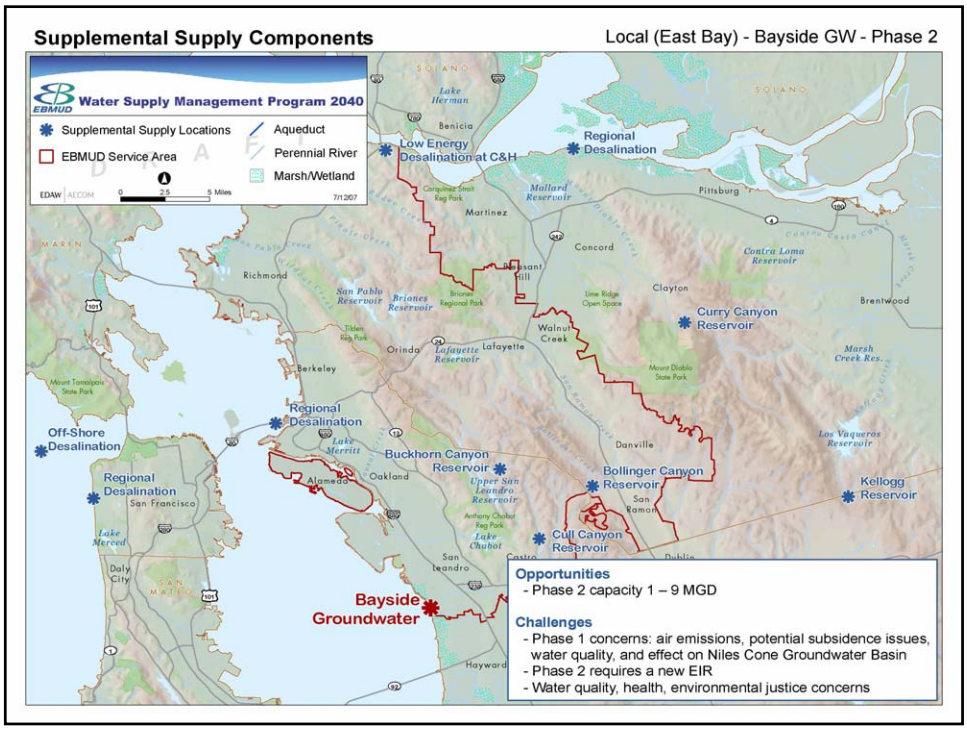
Central Valley
1. Groundwater Banking/Exchange (San Joaquin Basin)
2. Groundwater Banking/Exchange (Sacramento Basin)
3. Duck Creek Reservoir
4. Water Transfers

Local (East Bay)
1. Kellogg Reservoir
2. Buckhorn Canyon Reservoir
3. Cull Canyon Reservoir
4. Curry Canyon Reservoir
5. Bollinger Canyon Reservoir
6. Bayside GW - Phase 2
7. Regional Desalination
8. Low Energy Application for Desalination (LEAD) at C&H Sugar
9. Off-Shore Desalination
10. Water Transfers with Bay Area Agencies

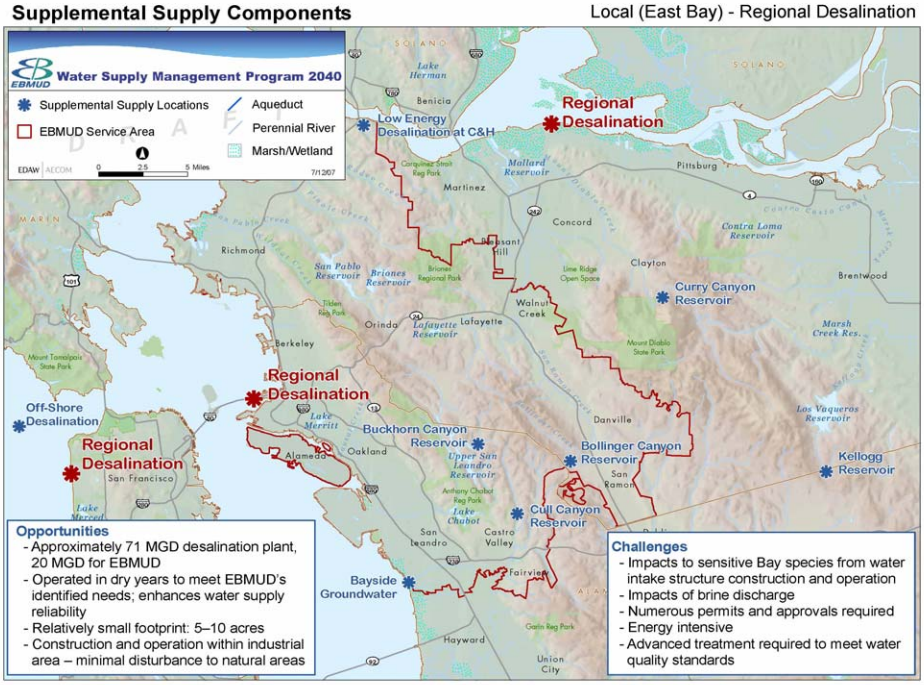
Supplemental Supply Components — Upcountry - Pardee




Supplemental Supply Components
Upcountry - Inter-Regional Conjunctive Use Project
Sacramento Basin Groundwater
Rancho Murieta
Lower Bear
Middle Bar
Pardee Reservoir
Camanche Reservoir
Duck Creek
San Joaquin Groundwater
Inter Regional Conjuntive Use Project
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
DRAFT
Opportunities
- Annual yields between 10 – 50 TAF
- Groundwater banking, exchange and transfer between project partners
- Higher groundwater levels (San Joaquin County)
- Greater water supply reliability
- Flexible, can be phased
- Collaborative approach to longstanding water conflicts along the Mokelumne River
Challenges
- Each participant would need to negotiate institutional arrangements
- History of competing interests, different water needs, and different values among participants
- Additional on-stream or off-stream storage and regulating facilities may be needed


Supplemental Supply Components
Local (East Bay) - Bayside GW - Phase 2
Water Supply Management Program 2040
Supplemental Supply Locations
EBMUD Service Area
Aqueduct
Perennial River
Marsh/Wetland
DRAFT
Low Energy Desalination at C&H
Regional Desalination
Curry Canyon Reservoir
Off-Shore Desalination
Regional Desalination
Buckhorn Canyon Reservoir
Bollinger Canyon Reservoir
Kellogg Reservoir
Cull Canyon Reservoir
Bayside Groundwater
Opportunities
- Phase 2 capacity 1 – 9 MGD
Challenges
- Phase 1 concerns: air emissions, potential subsidence issues, water quality, and effect on Niles Cone Groundwater Basin
- Phase 2 requires a new EIR
- Water quality, health, environmental justice concerns

Supplemental Supply Components Local (East Bay) - Regional Desalination



Water Supply Management Program 2040

Conservation
1995 – 2008

1. Considered completed for WSMP 2040 planning
2. Water savings estimates:
   - 19.5 MGD through 2006
   - 1.5 MGD/yr for 2007 & 2008
   - 22.5 MGD total (District + natural savings)
3. Programs:
   - Residential and non-residential water surveys and incentives (plumbing fixtures, appliances, irrigation, etc)
   - Natural Conservation (codes & regulatory)
   - Education & Outreach

Water Supply Management Program 2040

Conservation Approach
2008 & beyond

- Consider range of measures from natural savings to total "need for water"
- Maximize "technology" over "behavioral" savings
- Evaluate "demand hardening" implications
- Evaluate supply side (non-revenue) savings

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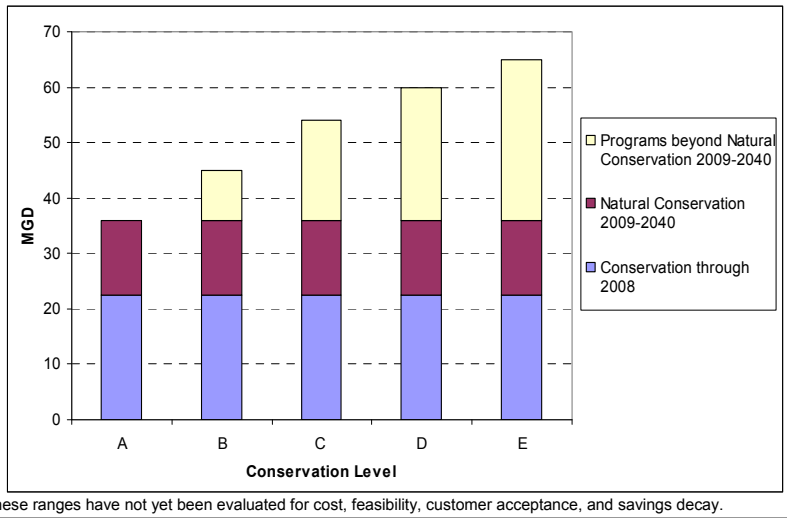
Water Supply Management Program 2040

Preliminary Conservation Ranges*



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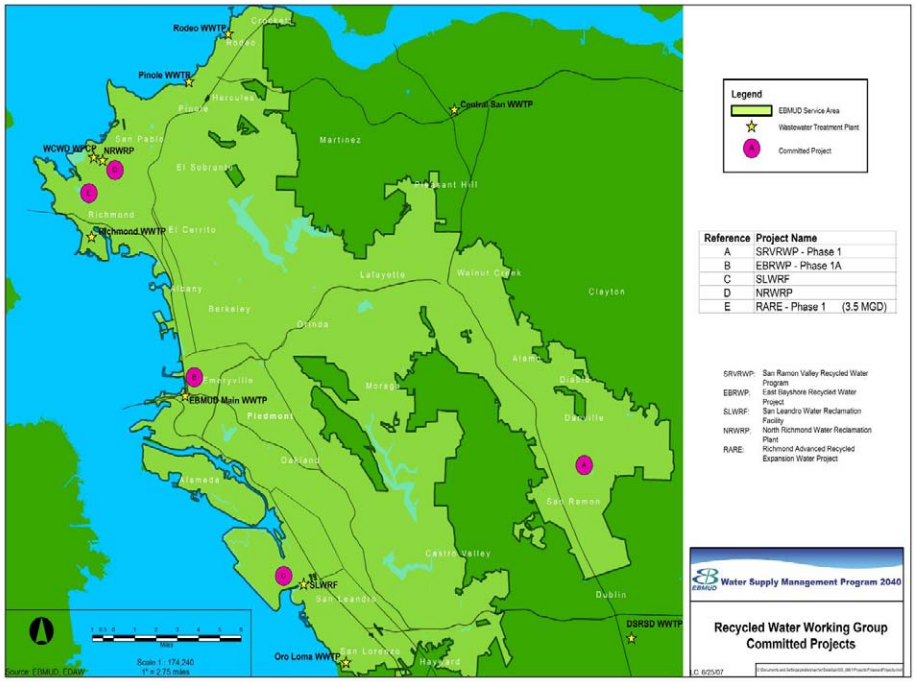
*These ranges have not yet been evaluated for cost, feasibility, customer acceptance, and savings decay.

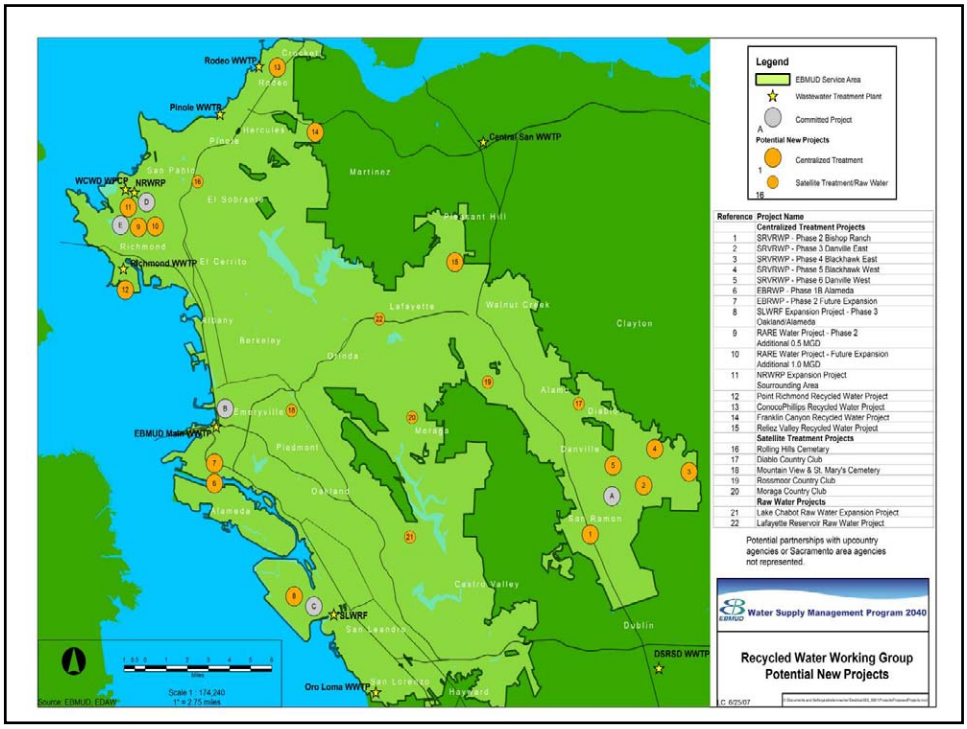
Water Supply Management Program 2040

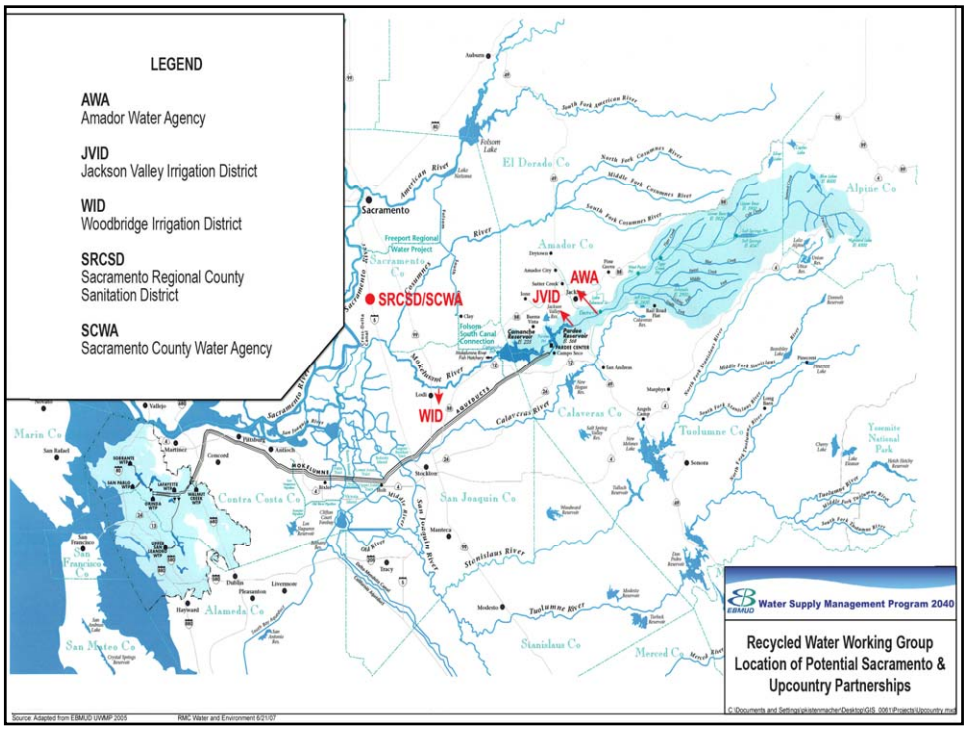
Recycled Water/Non-Potable Water

Categories:

1. Committed Projects
2. Potential New Projects within EBMUD Service Area
   - Centralized Treatment
   - Satellite Treatment
   - Raw Water
   - Groundwater (non-potable use)
   - Salt Water (fire suppression)
3. Potential Partnerships with Upcountry Agencies
4. Potential Partnership with Sacramento Area Agencies




Legend
EBMUD Service Area
Wastewater Treatment Plant
Committed Project
Potential New Projects
Centralized Treatment
Satellite Treatment/Raw Water
Reference Project Name
Centralized Treatment Projects
1 SRVRWP - Phase 2 Bishop Ranch
2 SRVRWP - Phase 3 Danville East
3 SRVRWP - Phase 4 Blackhawk East
4 SRVRWP - Phase 5 Blackhawk West
5 SRVRWP - Phase 6 Danville West
6 EBRWP - Phase 1B Alameda
7 EBRWP - Phase 2 Future Expansion
8 SLWRF Expansion Project - Phase 3 Oakland/Alameda
9 RARE Water Project - Phase 2 Additional 0.5 MGD
10 RARE Water Project - Future Expansion Additional 1.0 MGD
11 NRWRP Expansion Project Sourrounding Area
12 Point Richmond Recycled Water Project
13 ConocoPhillips Recycled Water Project
14 Franklin Canyon Recycled Water Project
15 Rellez Valley Recycled Water Project
Satellite Treatment Projects
16 Rolling Hills Cemetery
17 Diablo Country Club
18 Mountain View & St. Mary's Cemetery
19 Rossmoor Country Club
20 Moraga Country Club
Raw Water Projects
21 Lake Chabot Raw Water Expansion Project
22 Lafayette Reservoir Raw Water Project
Potential partnerships with upcountry agencies or Sacramento area agencies not represented.
Water Supply Management Program 2040
Recycled Water Working Group
Potential New Projects
Rodeo WWTP
Pinole WWTP
Central San WWTP
WCCWD WPCP
NRWRP
Richmond WWTP
EBMUD Main WWTP
SLWRF
Oro Loma WWTP
DSRSD WWTP
Crockett
Hercules
Pinole
San Pablo
El Sobrante
Richmond
El Cerrito
Martinez
Pleasant Hill
Lafayette
Walnut Creek
Clayton
Albany
Berkeley
Orinda
Moraga
Piedmont
Emeryville
Oakland
Alameda
Danville
San Ramon
Castro Valley
San Leandro
Hayward
Dublin


LEGEND
AWA
Amador Water Agency
JVID
Jackson Valley Irrigation District
WID
Woodbridge Irrigation District
SRCSD
Sacramento Regional County Sanitation District
SCWA
Sacramento County Water Agency
SRCSD/SCWA
AWA
JVID
WID
Sacramento
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
Yosemite National Park
Marin Co
Contra Costa Co
San Joaquin Co
Stanislaus Co
Merced Co
Alameda Co
San Mateo Co
Water Supply Management Program 2040
Recycled Water Working Group
Location of Potential Sacramento & Upcountry Partnerships

Water Supply Management Program 2040

Next Steps for Component Development

1. Present Conservation & Recycled Water Components at 9/25/07 Board workshop
2. Evaluate & Screen ALL components (October – November 2007)
3. Present Supplemental Supply Components at 11/27/07 Board workshop
4. Assemble Components into Preliminary Portfolios (January – February 2008)
5. Present Portfolios at 4/22/08 Board workshop

Water Supply Management Program 2040

Evaluation of Climate Change Impacts

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Water Supply Management Program 2040

Today

1. Background
   - CA Regulations
   - Global Climate Change Science
2. Potential Impacts – CA & EBMUD
3. Approach for WSMP 2040

Water Supply Management Program 2040

CA Formally Addresses Global Climate Change

- 2005: Executive Order established Emissions Reduction Goals
- 2006: California Global Warming Solutions Act (AB 32)
- 2006: DWR report on progress & global warming impacts

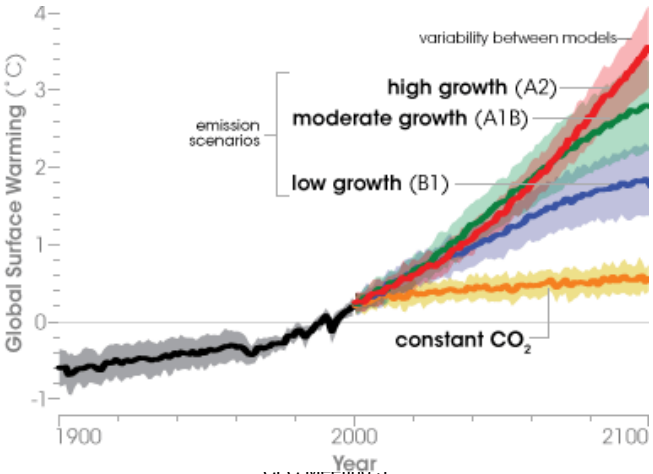
Water Supply Management Program 2040

Global Climate Change Science

- 20+ global climate change models (GCMs) used in 18 modeling centers worldwide
- 4 main climate change scenarios
- Multiple input factors to models

Water Supply Management Program 2040

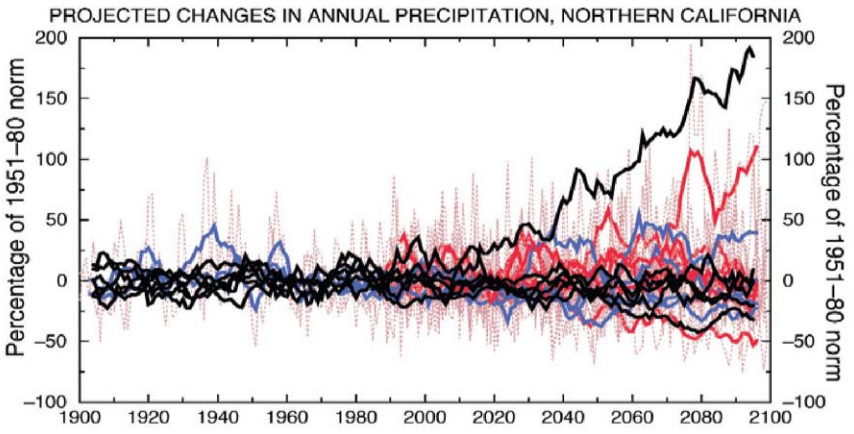
Range of Projections for Increasing Global Surface Temperature through 2100



Source: United States Environmental Protection Agency /NASA Earth Observatory, based on IPCC Fourth Assessment Report (2007)

Water Supply Management Program 2040

General Conclusions of CA Regional Modeling



Dettinger, 2005

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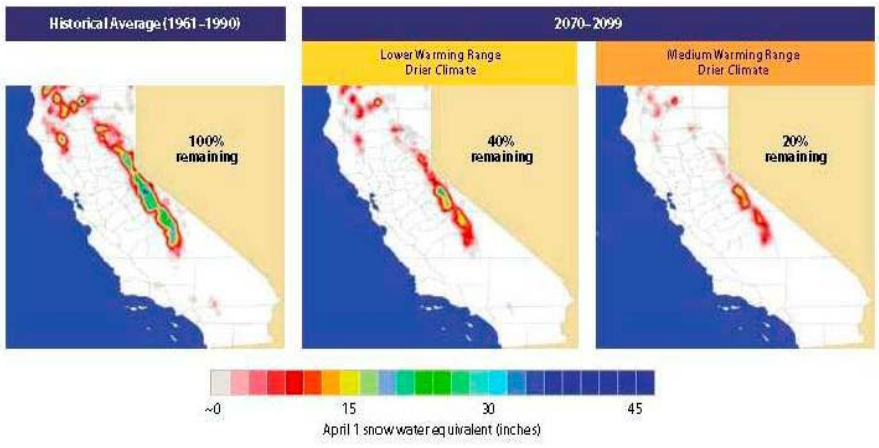
Water Supply Management Program 2040

Decreasing California Snowpack



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Source: Our Changing Climate, Summary Report from the CA Climate Change Center, 2006

Water Supply Management Program 2040

Potential Impacts on EBMUD

- Increased water demands for outdoor uses
- Change in timing and volume of Mokelumne River runoff
- Increased challenges in reservoir management
- Increased flooding creating infrastructure impacts
- Change in snow pack
- Change in drought frequency & duration

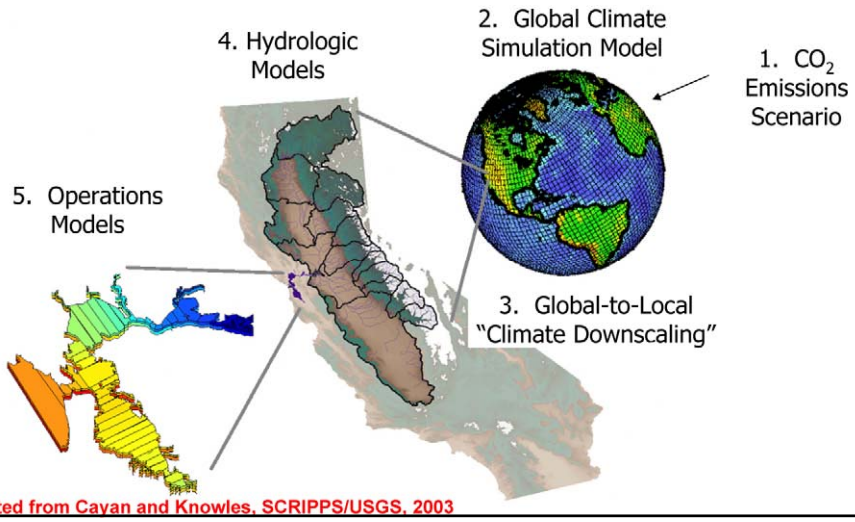
Water Supply Management Program 2040

Goal

- *Focus on how EBMUD system is vulnerable to climate change*
- *Conduct sensitivity analyses to evaluate & score flexibility of each portfolio to respond to climate change*
- *Consider secondary (or backup) elements for use under worsening conditions or predictions*

Water Supply Management Program 2040

Challenges in Climate Change Modeling



Adapted from Cayan and Knowles, SCRIPPS/USGS, 2003

Water Supply Management Program 2040

General Approaches - Water Resource Planning

Top-Down

1. Global Emissions Scenarios
2. Global Climate Modeling
3. Downscale Global Future Climate to Region
4. Model Water Resource Impacts

Bottom-Up

4. Develop Portfolios to Address Vulnerabilities
3. Evaluate Sensitivity of System to each Vulnerability?
2. Determine Range of Vulnerabilities
1. Identify Critical Vulnerabilities

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Water Supply Management Program 2040

Bottom-Up Approach

1. Identify potential variables
   - Customer demand
   - Runoff amount
   - Runoff pattern
   - Weather variability (i.e. length and frequency of drought)
2. Test existing system against variables
   - How will the system change with each variable?
   - What are critical vulnerabilities?
3. Develop portfolios to address vulnerabilities
4. Evaluate Portfolios
   - How do portfolios respond to variables?
   - Which are the most flexible?

Oakland Control Center

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

Provide water supply reliability.
Preserve current water right entitlements.
Promote District involvement in regional, sustainable solutions.

Economic

Minimize cost to District customers.
Minimize drought impact to District customers.

Public Health, Safety & Community

Protect the high quality of the District's water supply.
Minimize adverse sociocultural impacts (including environmental justice).
Minimize risks to public health & safety.
Maximize security of infrastructure & water supply.

Environmental

Preserve & protect the environment for future generations.
Preserve & protect biological resources.
Contribute to reduction in carbon footprint.
Provide appropriate recreational opportunities.

Water Supply Management Program 2040

Summary

- Uncertain future conditions
- Focus on EBMUD system vulnerabilities
- Develop flexible Portfolios to address uncertain conditions

Water Supply Management Program 2040

Climate Change Approach – Other Agencies

Contra Costa WD	Maintain conservative drought planning sequence. No specific climate change approach.
Santa Clara Valley WD	Maintain conservative drought planning sequence. Is preparing climate change approach.
SFPUC	Sensitivity analyses for climate change impacts on the Hetch Hetchy system were conducted. Specific details pending.
CVP Operations (USBR)	Comprehensive sensitivity analysis underway, based on a result portfolio using 22 GCM/emissions scenarios.
SWP Operations (DWR)	Sensitivity analysis based on results of DWR's perturbation of historic hydrology.
Metropolitan Water District	Adaptive management approach that includes voluntary water transfers to improve supply reliability, increasing storage capacity.

EBMUD Water Supply Management Program 2040

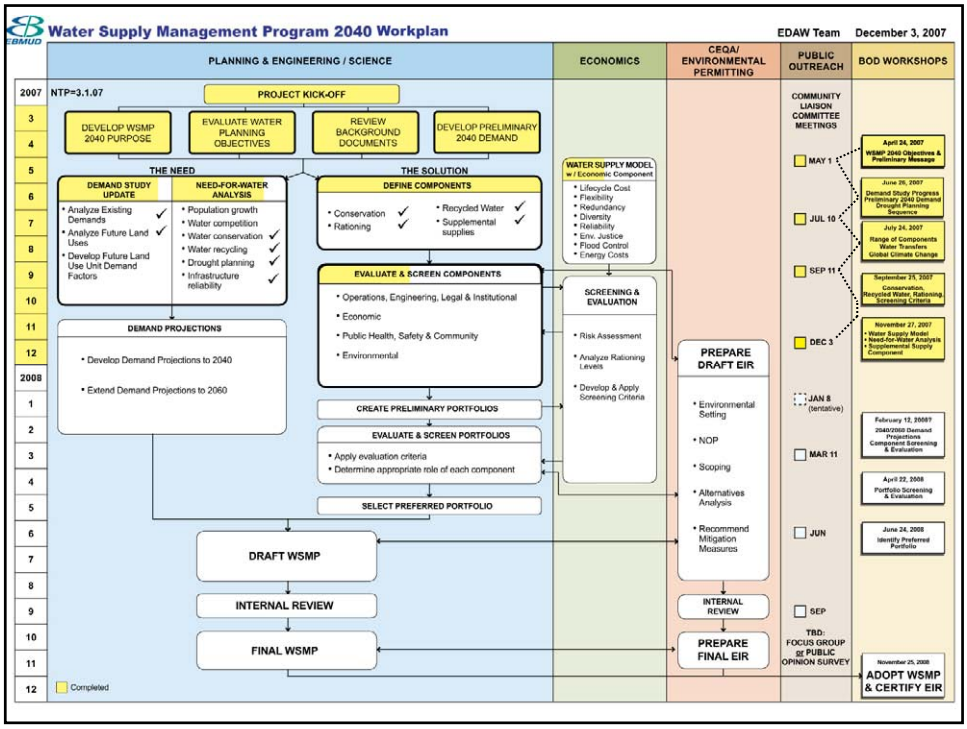
Community Liaison Committee
Fourth Meeting
December 3, 2007

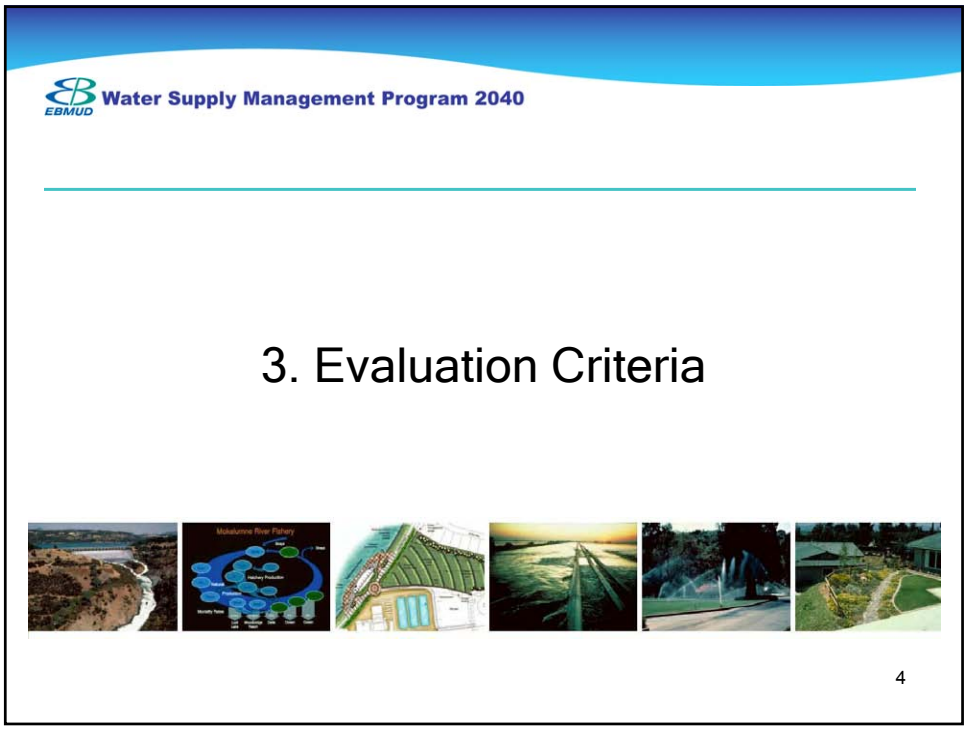
EBMUD Water Supply Management Program 2040

Agenda

1. Welcome and Introductions
2. WSMP 2040 Progress
3. Evaluation Criteria
4. Water Supply Model & Need for Water Results
5. Solution Components:
   a. Conservation
   b. Rationing
   c. Recycled Water
   d. Supplemental Supply
6. Other Comments or Questions
7. Public Comment
8. Next Meeting Dates

2


Water Supply Management Program 2040 Workplan
EDAW Team
December 3, 2007
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
NTP=3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP PRELIMINARY 2040 DEMAND
THE NEED
THE SOLUTION
DEMAND STUDY UPDATE
NEED-FOR-WATER ANALYSIS
DEFINE COMPONENTS
WATER SUPPLY MODEL w / Economic Component
DEMAND PROJECTIONS
EVALUATE & SCREEN COMPONENTS
SCREENING & EVALUATION
CREATE PRELIMINARY PORTFOLIOS
EVALUATE & SCREEN PORTFOLIOS
SELECT PREFERRED PORTFOLIO
PREPARE DRAFT EIR
DRAFT WSMP
INTERNAL REVIEW
FINAL WSMP
PREPARE FINAL EIR
COMMUNITY LIAISON COMMITTEE MEETINGS
MAY 1
JUL 10
SEP 11
DEC 3
JAN 8 (tentative)
MAR 11
JUN
SEP
TBD: FOCUS GROUP or PUBLIC OPINION SURVEY
ADOPT WSMP & CERTIFY EIR
Completed


Water Supply Management Program 2040
3. Evaluation Criteria
4

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

1. Provide water supply reliability.
2. Utilize current water right entitlements.
3. Promote District involvement in regional ~~sustainable~~ solutions.

Economic

1. Minimize cost to District customers.
2. Minimize drought impact to District customers.
3. Maximize positive impact to local economy.

Public Health, Safety & Community

1. Ensure the high quality of the District's water supply.
2. Minimize adverse sociocultural impacts (including environmental justice).
3. Minimize risks to public health & safety.
4. Maximize security of infrastructure & water supply.

Environmental

1. Preserve & protect the environment for future generations.
2. Preserve & protect biological resources.
3. Minimize carbon footprint.
4. Promote recreational opportunities.

5

Water Supply Management Program 2040

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6

Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

1. Provide Water Supply Reliability

Exclusion Criteria

1. Must be technically feasible using proven technology.
2. Must meet projected water demands through 2040.
3. Must meet demand during the District's Drought Planning Sequence.
4. Must not be located in areas of unmitigable geologic, hydrologic or toxic/hazardous materials hazards.

7

Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

1. Provide Water Supply Reliability

Evaluation Criteria

1. Minimize the vulnerability & risk of disruptions.
2. Minimize disruptions in water service during construction.
3. Maximize the system's operational flexibility to respond to change.
4. Maximize implementation flexibility to respond to change.
5. Minimize the institutional & legal complexities & barriers.

8

Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

2. Utilize current water right entitlements

Exclusion Criteria

1. Must meet all existing & anticipated water rights permit & license conditions, all dam & reservoir operating permit conditions, including releases for instream & downstream users.

Evaluation Criteria

1. Optimize use of existing water right entitlements.

9

Water Supply Management Program 2040

Operations, Engineering, Legal & Institutional Criteria

3. Promote District involvement in regional solutions

Evaluation Criteria

1. Maximize partnerships & regional solutions.

10

Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

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2. Preserve & protect biological resources.
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Water Supply Management Program 2040

Economic Planning Criteria

1. Minimize cost to District customers

Evaluation Criteria

1. Maximize use of lowest cost water supply options.

2. Minimize the financial cost to the District of meeting customer demands for given level of system reliability.

12

Water Supply Management Program 2040

Economic Planning Criteria

2. Minimize drought impact to customers

Exclusion Criteria

1. Must not result in average annual customer shortages exceeding 25% of demand for District design drought.

Evaluation Criteria

1. Minimize customer water shortage costs & District supply augmentation costs.

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Water Supply Management Program 2040

Economic Planning Criteria

3. Maximize positive impact to local economy

Evaluation Criteria

1. Maximize local water supply options.

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

1. Provide water supply reliability.
2. Utilize current water right entitlements.
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Environmental

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

1. Ensure the high quality of the District's water supply

Exclusion Criteria

1. Must ensure that the District's potable water will be able to meet existing & future state & federal primary & secondary drinking water quality standards.
2. Must ensure that the District's non-potable water will be of suitable quality for District use.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

1. Ensure the high quality of the District's water supply

Evaluation Criteria

1. Minimize potential adverse impacts to the public health of District customers.
2. Maximize use of water from the best available source.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

2. Minimize adverse sociocultural impacts
3. Minimize risks to public health & safety

Evaluation Criteria

1. Minimize disproportionate public health or economic impact to minority or low-income populations (environmental justice).
2. Minimize adverse impacts to cultural resources, including important archaeological, historical, & other cultural sites.
3. Minimize short-term community impacts.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

2. Minimize adverse sociocultural impacts
3. Minimize risks to public health & safety

Evaluation Criteria

4. Minimize long-term adverse community impacts (e.g., aesthetics, noise, air quality).

5. Minimize adverse social effects (e.g., impacts to community character, social cohesion, community features).

6. Minimize conflicts with existing & planned facilities, utilities & transportation facilities.

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Water Supply Management Program 2040

Public Health, Safety, & Community Criteria

4. Maximize security of infrastructure & water supply

Evaluation Criteria

1. Minimize the risk of death or injury from the failure of a program component in an earthquake or flood or from other causes.

2. Maximize the protection of supply sources & associated infrastructure.

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional

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4. Promote recreational opportunities.

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Water Supply Management Program 2040

Environmental Criteria

1. Preserve & protect the environment for future generations

Evaluation Criteria

1. Minimize adverse impacts on the environment (including land, air, water, minerals, flora, fauna, noise, & aesthetics).

2. Minimize construction & operation effects on environmentally sensitive resources.

3. Maximize long-term sustainability by applying best management & sustainability principles.

22

Water Supply Management Program 2040

Environmental Criteria

2. Preserve & protect biological resources

Exclusion Criteria

1. Must not cause a net loss of **wetlands & riparian habitat**.

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Water Supply Management Program 2040

Environmental Criteria

2. Preserve & protect biological resources

Evaluation Criteria

1. Maintain populations or known habitat of **state or federally listed plant or wildlife species** at or above sustaining levels.

2. Minimize the reduction of riverine habitat of state or federally listed fish species & must not cause a net loss of spawning or rearing habitat of native **anadromous fish species**.

3. Minimize impacts to **wetlands**, their values, & other jurisdictional waters of the United States.

4. Minimize **habitat loss** for sensitive & native plant & wildlife species, pristine areas & special habitat features.

24

Water Supply Management Program 2040

Environmental Criteria

2. Preserve & protect biological resources

Evaluation Criteria

5. Minimize adverse affects to native fish & other native aquatic organisms.
6. Maximize benefits to fish, including natural production of anadromous fish.
7. Maximize the likelihood of meeting federal & state ambient water quality standards to protect natural resources.
8. Minimize alterations to water flow in waterways & reservoirs/lakes that would have an adverse impact on biological resources.

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Water Supply Management Program 2040

Environmental Criteria

3. Minimize carbon footprint

Evaluation Criteria

1. Minimize short term & long term greenhouse gas emissions from construction (e.g., raw material & waste transportation, construction equipment use, site deforestation, carbon emissions from cement production).
2. Maximize energy efficiency associated with operations & maintenance.
3. Maximize CO2-efficient & renewable energy use.
4. Maximize contributions to AB 32 goals.

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Water Supply Management Program 2040

Environmental Criteria

4. Promote recreational opportunities

Evaluation Criteria

1. Minimize adverse impacts to recreation resources, designated parklands, designated wilderness areas, or lands permanently dedicated to open space, particularly rare opportunities & ADA access that are not found in other parts of the region.

2. Provide recreational benefits.

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Water Supply Management Program 2040

Building the Water Supply Portfolio

(flip chart)

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EBMUD Water Supply Management Program 2040

Evaluating the Water Supply Portfolio
(flip chart)

29

EBMUD Water Supply Management Program 2040

4. Water Supply Model & Need for Water

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Water Supply Management Program 2040

WSMP: 2020 & 2040

WSMP 2020

- Primary supply = Mokelumne Watershed
- Linear system

WSMP 2040

- Considering multiple supply sources
- More complicated system
- Require flexible portfolios to address increased uncertainty (e.g., climate change)

31

Water Supply Management Program 2040

Purpose of Model

- Simulation of water delivery to District service area, upcountry & central valley projects
- Efficient simulation & evaluation of multiple portfolios
- Consideration of diverse portfolios

32

Water Supply Management Program 2040

Model Design

- Incorporate District's existing planning model: EBMUDSIM
- Water Evaluation And Planning (WEAP) System Model – water supply model
- Link models (WEAP & EBMUDSIM) to simulate entire system

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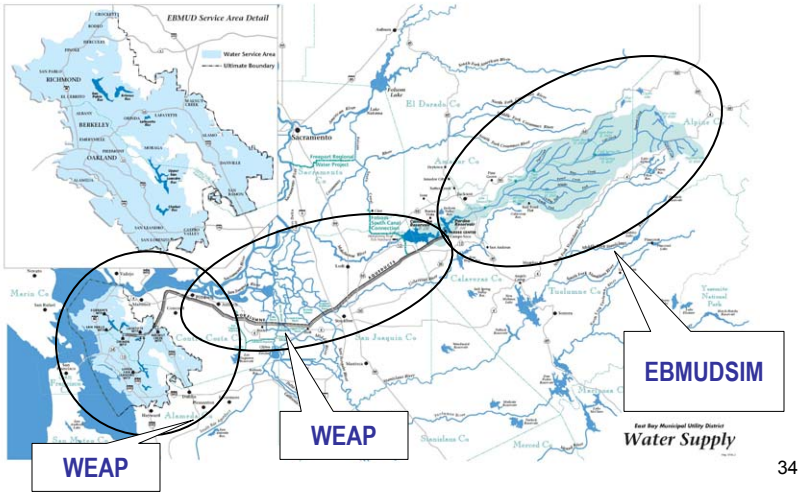
Water Supply Management Program 2040

WEAP-EBMUDSIM (W-E) Conceptual Model



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Water Supply Management Program 2040

Model Input

- Fixed Level of Demands at 2040
- Historical Mokelumne River hydrology (1921 – 2003)
- Key infrastructure & operating rules (i.e., Aqueducts, Pardee Reservoir, Freeport, Bayside)
- Joint Settlement Agreement releases to Lower Mokelumne River
- Costs – capital & O&M

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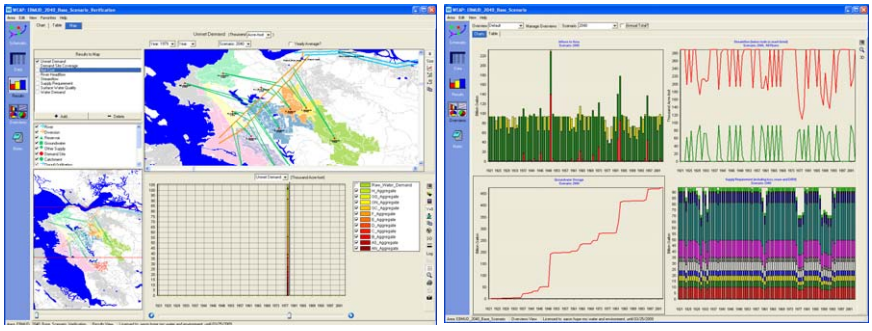
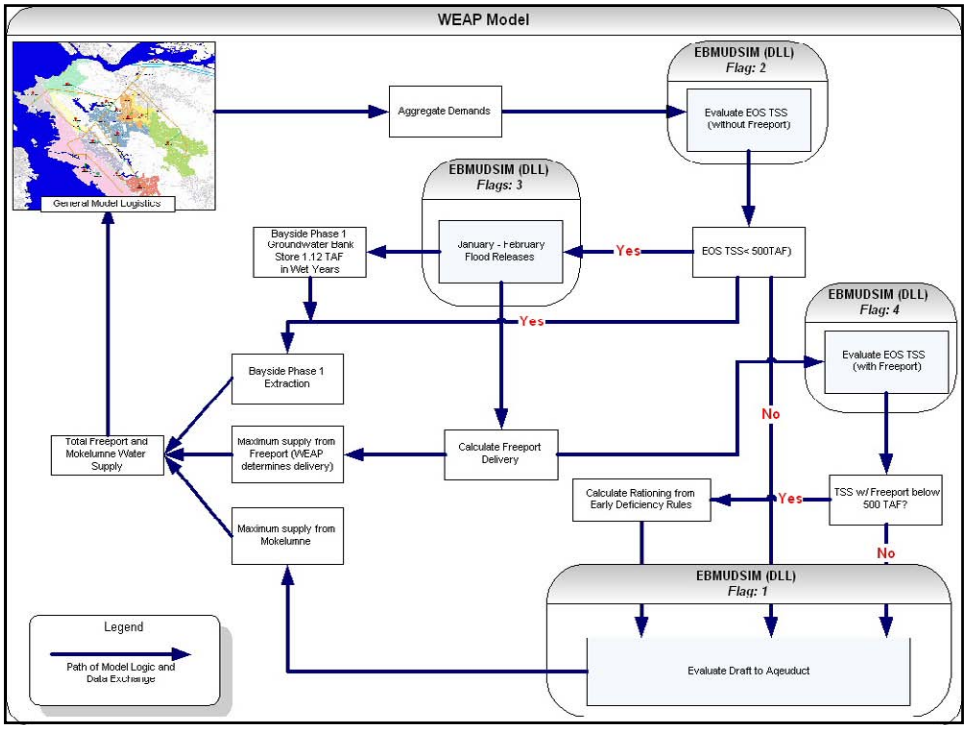
Water Supply Management Program 2040

Model Output

- Water Demand
- Water Supplies & Resources
- Financial Information





Water Supply Management Program 2040

W-E Model Verification

- Model verified by running both models (EBMUDSIM & W-E) with same components
- Parameters compared include Freeport delivery schedule, Mokelumne draft & rationing

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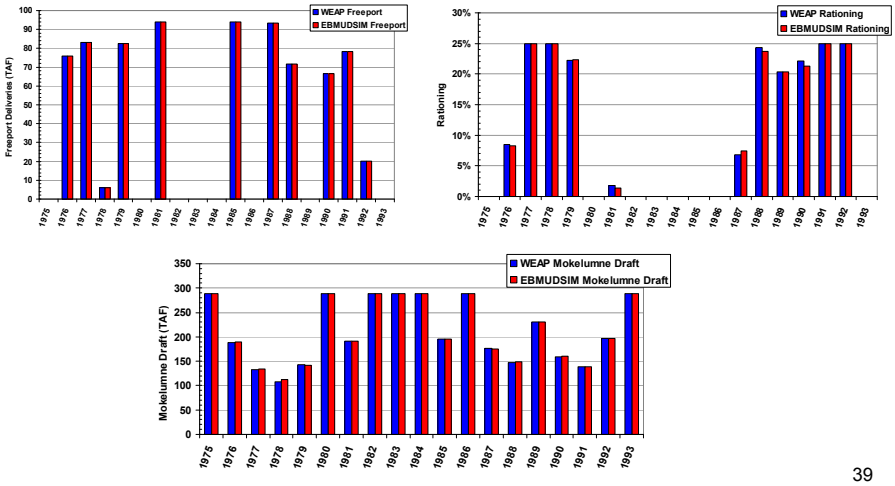
Water Supply Management Program 2040

W-E Model Verification



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Water Supply Management Program 2040

Need for Water Analysis Assumptions - Demands

- Used midpoint of the range for the 2040 preliminary demand estimate (258MGD)
- Preliminary demand estimate assumes:
  - Recycled water projects through 2010
  - Conservation
    - District programs through 2008
    - Natural replacement through 2020

(40 MGD)

40

Water Supply Management Program 2040

Need for Water Analysis Assumptions - Supply

- Current Pardee & Camanche water rights applicable to entire modeling period
- Full use of water rights senior to the District's
- CVP deliveries per water supply contract via Freeport Regional Water Project
- Bayside Groundwater Phase I is active

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Water Supply Management Program 2040

Freeport Regional Water Project

- Modeled according to physical capacity and contractual constraints
- CVP deliveries are triggered when End-of-Sept. Total System Storage < 500 TAF
- Once triggered, FRWP deliveries commence on March 1st at maximum rate, 100 MGD

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Water Supply Management Program 2040

Need for Supplemental Water Supplies in 2040 During DPS

Maximum rationing	Gross Annual Average Customer Demand (MGD)	Need for Water over 3 years (TAF)[b]	Average Annual Need for Water (MGD)
25%	298[a]	150	45
15%	298	216	64
10%	298	248	73
0%	298	306	91

a. *Includes 258 MGD + 40MGD for ongoing recycling, conservation & natural replacement*

b. *Estimated values*

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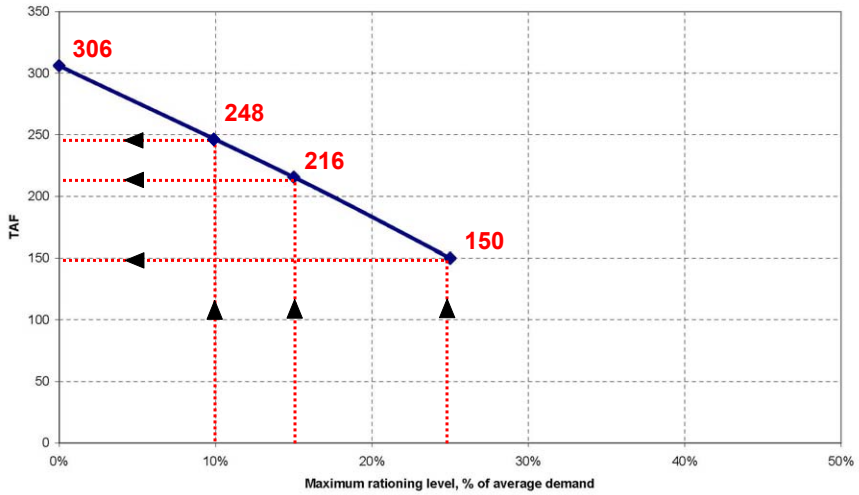
Water Supply Management Program 2040

Need for Supplemental Water in 2040



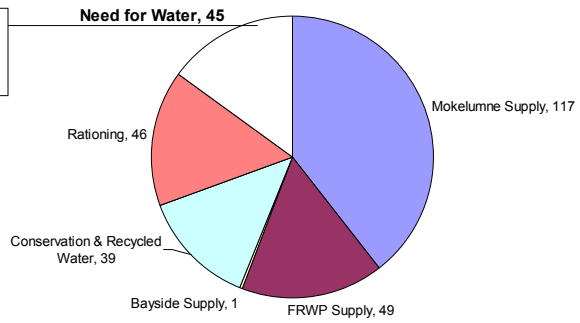
Water Supply Management Program 2040

2040 Water Supply
25% Maximum Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
25% maximum rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



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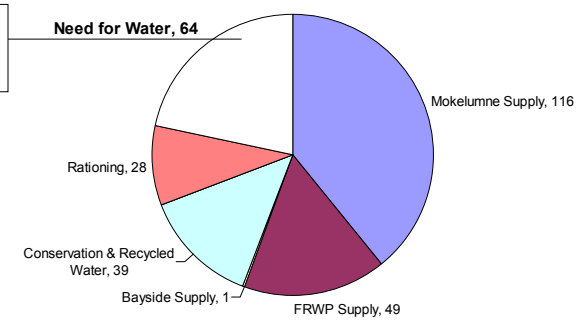
Water Supply Management Program 2040

2040 Water Supply
15% Maximum Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
15% maximum rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



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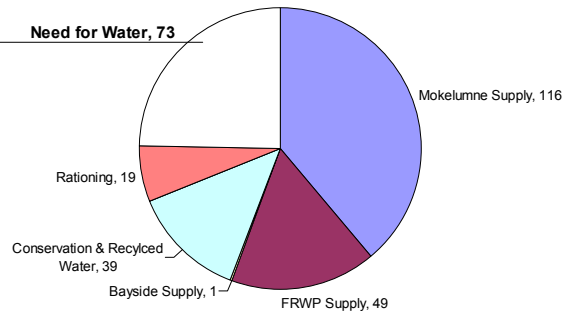
Water Supply Management Program 2040

2040 Water Supply
10% Maximum Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
10% maximum rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



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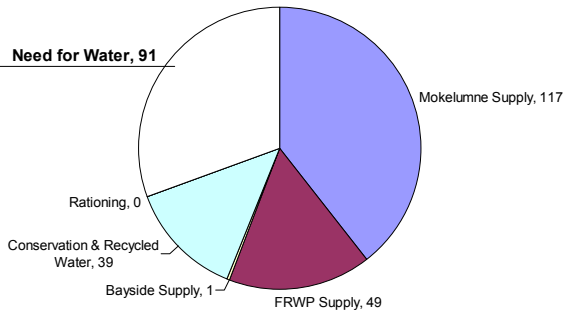
Water Supply Management Program 2040

2040 Water Supply
No Rationing

2040 Water Supply
Average during the 3-year Drought Planning Sequence

298 MGD Average Demand
No rationing

Possible Need for Water Solution:
- Conservation – Levels A-E
- Recycled Water
- Supplemental Supply Projects



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Water Supply Management Program 2040

Water Supply Model - Next Steps

1. Conduct climate change sensitivity analysis by varying parameters from Need for Water analysis
2. Incorporate financial/economic features in the model
3. Insert final 2040 Demand Projections
4. Develop portfolios from component projects
5. Use WEAP model as part of the portfolio analysis process

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Water Supply Management Program 2040

5. Solution Components

a Conservation
b Rationing
c Recycled Water
d Supplemental Supply

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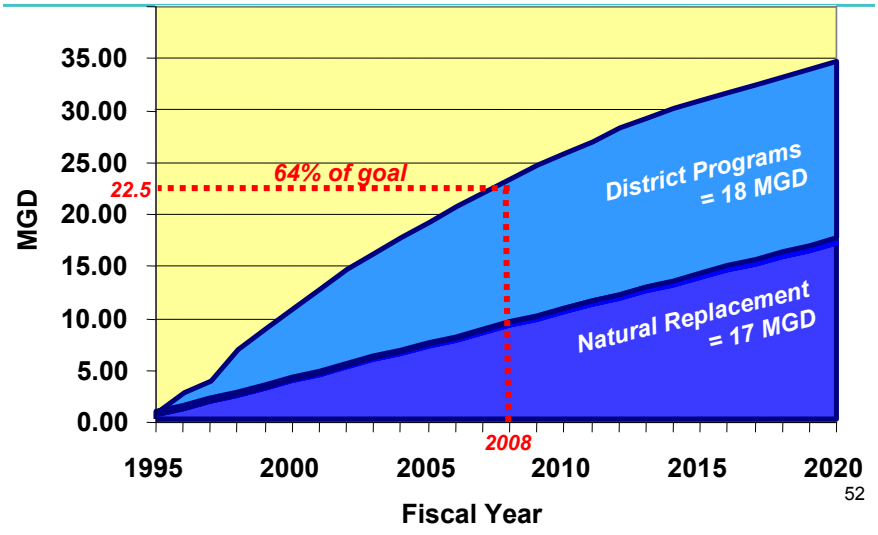
Water Supply Management Program 2040

5.a Water Conservation Component

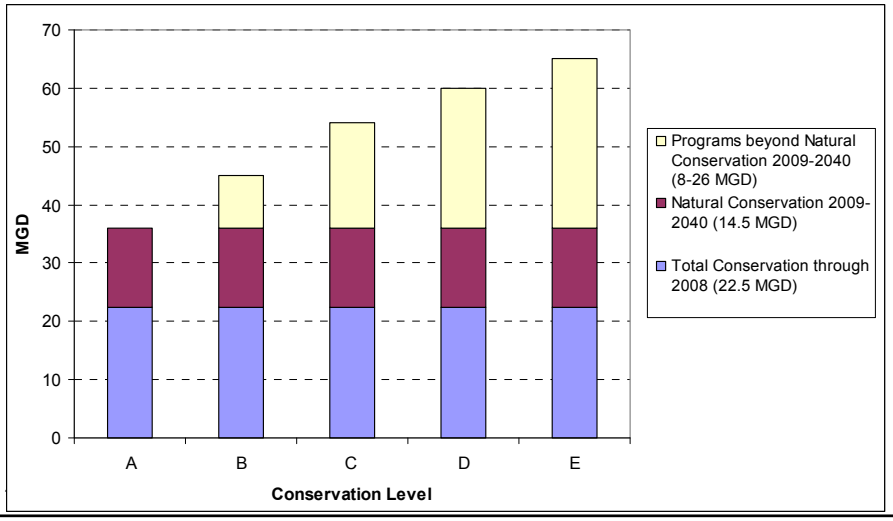
Water Supply Management Program 2040

Water Conservation Savings Goal
1995-2020



Water Supply Management Program 2040

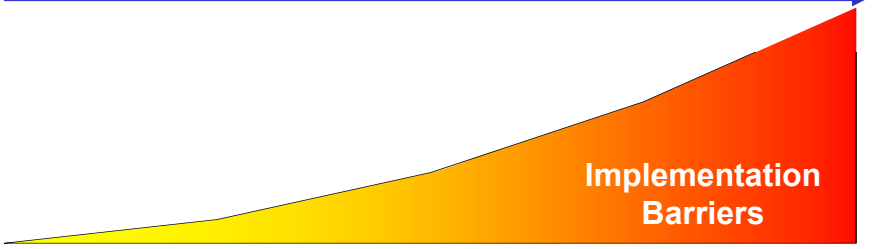
Preliminary Conservation Ranges



Water Supply Management Program 2040

Conservation Program Evaluation 2009-2040

A Conservation Levels E



LOWER BARRIER	HIGHER BARRIER
- Adopted technology	- Newer technology
- More practical	- More theoretical
- More voluntary measures	- More mandatory measures
- Lower market saturation	- Higher market saturation
- Lower implementation cost	- Higher implementation cost
- Lower savings uncertainty	- Higher savings uncertainty

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Water Supply Management Program 2040

Examples of Indoor Conservation Measures

- Residential water surveys*
- Commercial & industrial surveys*
- Clothes washer rebates*
- Toilet rebates*
- Showerheads, aerators
- Pre-rinse spray valves
- Dishwasher rebates
- Plumbing codes*
- Commercial washer rebates*
- Air-cooled ice machines
- Food steamers
- Hot water on-demand systems
- Commercial equipment upgrades
- Industrial process upgrades
- Digital x-ray technology

** Note: These measures have multiple implementation levels (2 or 3).*

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Water Supply Management Program 2040

Examples of Outdoor Conservation Measures

- Landscape water surveys*
- Landscape water budgets*
- Landscape ordinances*
- Advanced metering systems*
- Submetering
- Weather-based controllers*
- Leak detection/customer notification*
- Irrigation & landscape upgrades*
- District Pipeline leak repair*
- Graywater
- Pool covers
- Rainwater harvesting

** Note: These measures have multiple implementation levels (2 or 3).*

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Water Supply Management Program 2040

Evaluation Process

Step 1: Screen Conservation Measures

Conservation Measure (examples)	Evaluation Criteria			
	Operations	Economic	Public Health	Environ-mental
Clothes washer rebate	H	M	M	M
Residential surveys I	H	L	H	H
Weather-based controllers	M	M	M	H
Automated Metering Systems I	H	H	H	H
Automated Metering Systems II	H	M	H	M
Pipeline leak repair	L	L	M	M
Commercial dishwasher rebate	H	L	M	H
Graywater	L	L	L	L/M

Note: L=low; M=medium; H=high; scores provided here are for example only; actual screening & evaluation has not been completed.

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Water Supply Management Program 2040

Evaluation Process

Step 2: Cluster Measures by Conservation Level

Conservation Measure (examples)	Conservation Level				
	A	B	C	D	E
Plumbing code	**x**	x	x	x	x
Clothes washer rebate		**x**	x	x	x
Residential surveys I			**x**	x	x
Weather-based controllers			**x**	x	x
Automated Metering Systems I			**x**	x	x
Automated Metering Systems II				**x**	x
Pipeline leak repair				**x**	x
Commercial dishwasher rebate					**x**
Graywater	--	--	--	--	--

Note: Rankings are for example only; actual screening & evaluation has not been completed.

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Water Supply Management Program 2040

Evaluation Process

Step 3: Test Conservation Levels in Portfolios

Conservation Measure (examples)	Conservation Level				
	A	B	C	D	E
Plumbing code	**x**	x	x	x	x
Clothes washer rebate		**x**	x	x	x
Residential surveys I			**x**	x	x
Weather-based controllers			**x**	x	x
Automated Metering Systems I			**x**	x	x
Automated Metering Systems II				**x**	x
Pipeline leak repair				**x**	x
Commercial dishwasher rebate					**x**
Graywater	--	--	--	--	--

59

Note: Rankings are for example only; actual screening & evaluation has not been completed.

Water Supply Management Program 2040

Water Supply Portfolios

Building a Portfolio from Project Components

Components			
Conservation	Rationing	Recycled Water	Supp. Supply
A	0%	1	1
B	10%	2	2
C	15%	3	3
D	20%	4	4
E	25%	5	5
		6	6
		7	7
		8	8

Example Portfolio 1

60

Water Supply Management Program 2040

Conservation: Next Steps

- Present conservation component to CLC (Dec 2007)
- Apply screening criteria to conservation measures
- Build conservation program levels A through E
- Present screened measures & levels A-E at Feb. 2008 workshop
- Test conservation levels in water supply portfolios

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Water Supply Management Program 2040

5.b Drought Rationing Component

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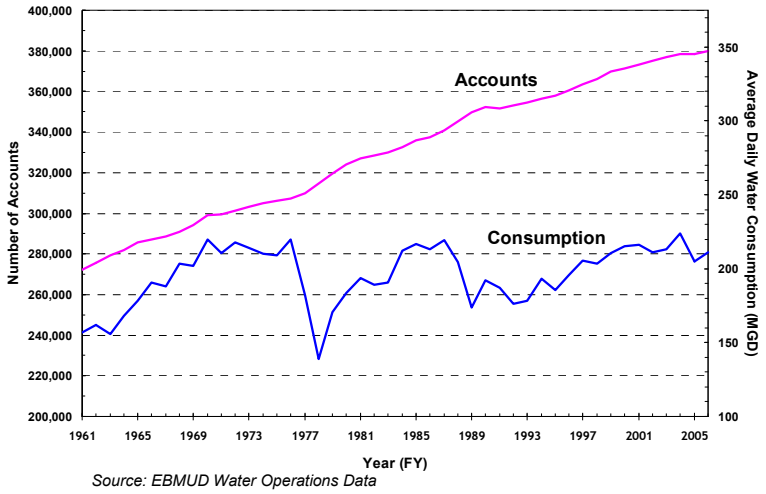
Water Supply Management Program 2040

EBMUD Accounts & Consumption

1961 - 2005



Source: EBMUD Water Operations Data

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Water Supply Management Program 2040

25% Maximum Rationing Criteria - Background

- 1977: 39% rationing achieved
- 1993: 25% goal incorporated into Water Supply Management Plan (WSMP 2020).
- Present: Board Policy 9.03

  Maximum water supply deficiency is 25%

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Water Supply Management Program 2040

Program Types

Stage	April Projection of Storage on September 30	Reduction Goal	Voluntary/ Mandatory
	500 TAF or more	None	
Moderate	500-450 TAF	0 to 15%	Voluntary
Severe	450-300	15 TO 25%	Mandatory
Critical	Less than 300 TAF	25%	Mandatory

TAF – Thousand Acre-Feet

Note: Projected storage includes supplemental supply

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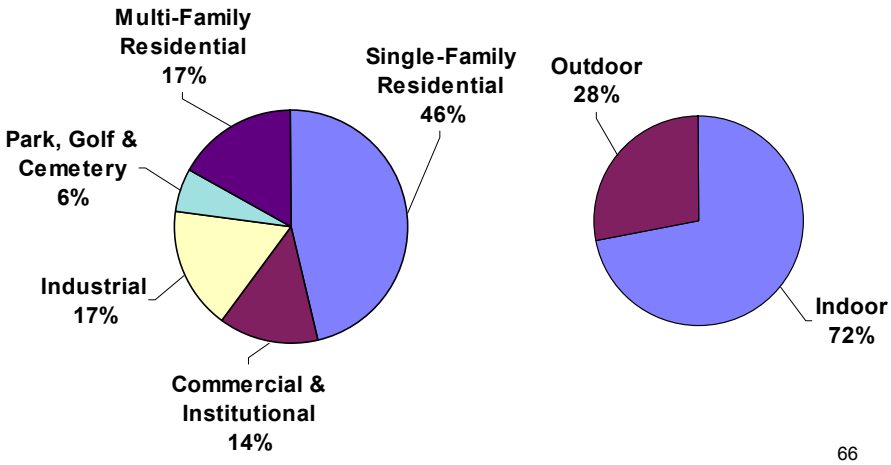
Water Supply Management Program 2040

EBMUD Water Use Characteristics

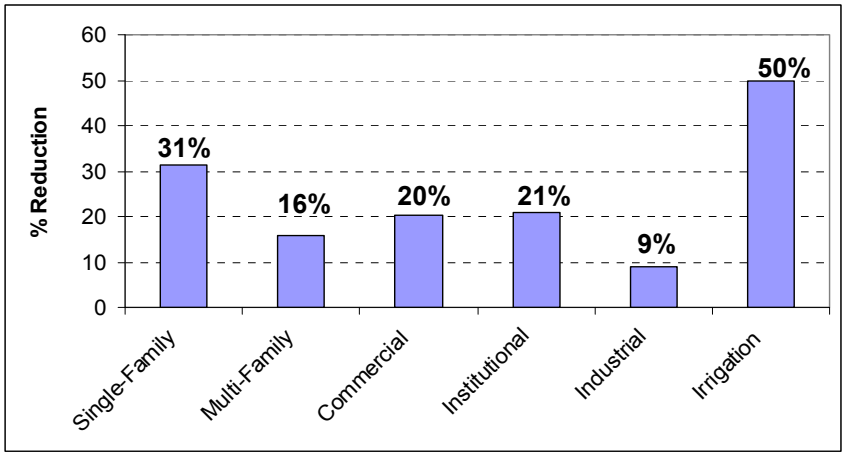


66

Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 25%

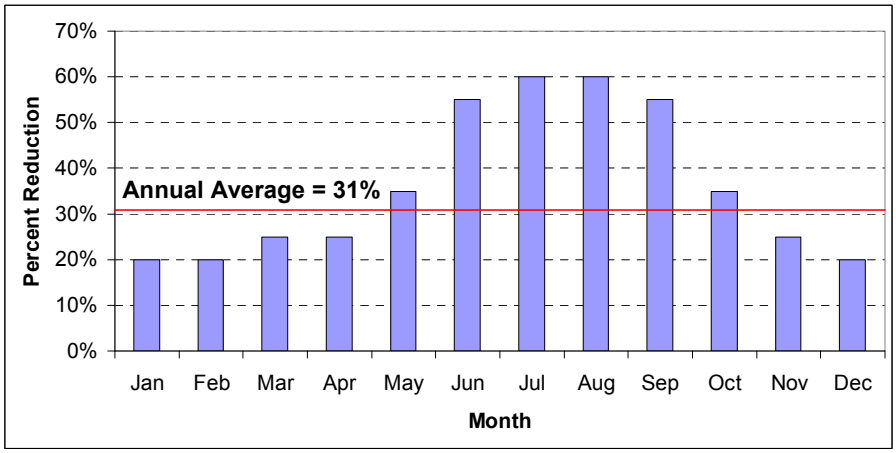


67

Water Supply Management Program 2040

Single-Family Residential

System-Wide Annual Average = 25%



68

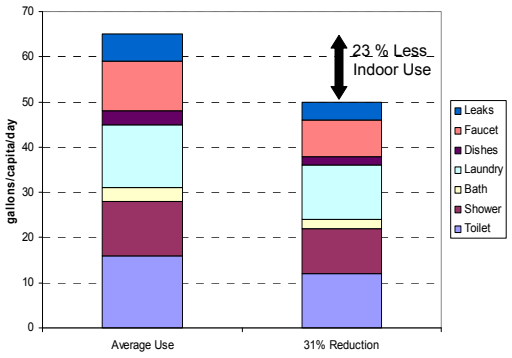
Water Supply Management Program 2040

Single-Family Residential

Indoor Use

Actions

- Fewer flushes / high-efficiency toilets
- Fewer loads / high-efficiency washers
- Use less: bath, dishes, faucets
- Repair leaks quickly



69

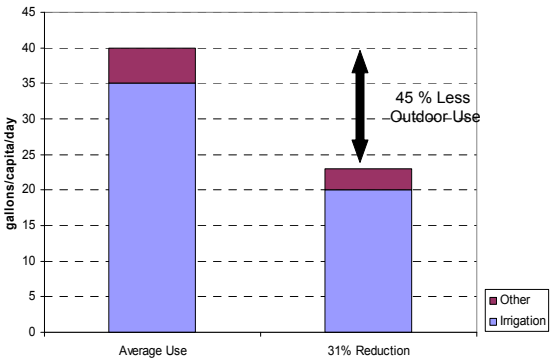
Water Supply Management Program 2040

Single-Family Residential

Outdoor Use

Actions

- Irrigate less than evapotranspiration
- Sweep rather than hose
- No new turf
- No fountains, etc.



70

Water Supply Management Program 2040

Planned Rationing for Other Agencies

Zone 7 Water Agency	0%
Metropolitan Water District of So. Cal.	0%
Marin Municipal Water District	20%
San Francisco PUC	Considering 20%
Contra Costa Water District	No Goal
Alameda County Water District	No Goal
Santa Clara Valley Water District	No Policy

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Water Supply Management Program 2040

5.c Recycled Water Component

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Water Supply Management Program 2040

Recycled Water/Non-Potable Water

1. Existing Raw Water Projects (0.3 mgd)
2. Existing Use at Main WWTP (5.9 mgd)
3. Committed Projects (9.3 mgd)
4. Potential New Projects within EBMUD Service Area
   - Centralized Treatment (Up to 13.5 mgd)
   - Satellite Treatment (Up to 0.9 mgd)
   - Raw Water (Up to 0.3 mgd)
   - Groundwater (non-potable use)
   - Salt Water (fire suppression)
5. Potential Partnerships with Upcountry Agencies (Up to 5.4 mgd)
6. Potential Partnership with Sacramento Area Agencies (Up to 11.6 mgd)

Total Potential New Projects = Up to 14.7 mgd additional in Service Area
= Up to 31.7 mgd additional overall
(including Upcountry & Sacramento areas)

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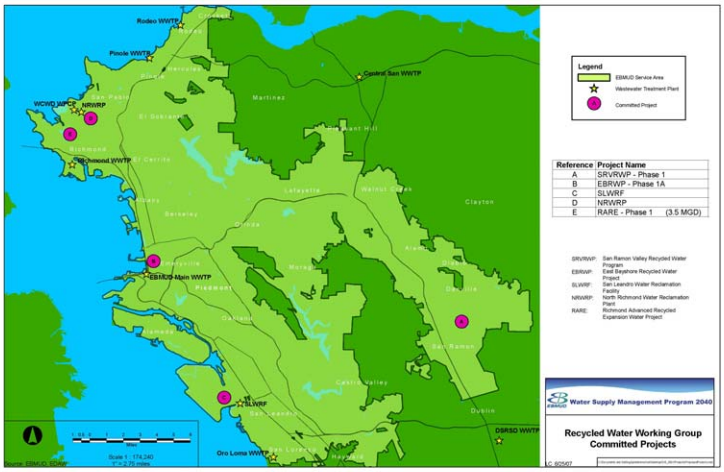
Water Supply Management Program 2040

Committed Projects



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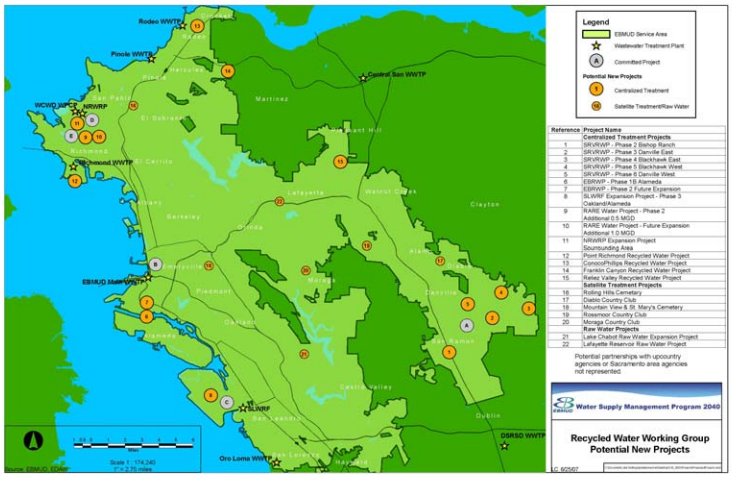
Water Supply Management Program 2040

Potential Projects within EBMUD Service Area



Water Supply Management Program 2040

Potential Projects within EBMUD Service Area

- Centralized Treatment
- Satellite Treatment
- Raw Water
- Groundwater (non-potable use) *no specific projects identified*
- Salt Water (fire suppression) *no specific projects identified*

Water Supply Management Program 2040

Centralized Treatment Projects

ConocoPhillips	Up to 4 mgd
East Bay Shore: Phase 1B (Alameda) Phase 2 (Future Expansion)	 0.5 - 1.7 mgd 0.1 - 0.5 mgd
Franklin Canyon	0.2 - 0.3 mgd
North Richmond - Surrounding Area	0.2 - 1.7 mgd
Point Richmond	0.1 mgd
RARE Water Project: Phase 2 Future Expansion	 0.5 mgd 1.0 mgd
Reliez Valley Recycled Water Project	0.1 - 0.2 mgd
San Leandro (Oakland/Alameda)	0.1 - 1.3 mgd
San Ramon Valley (Phases 2 through 6)	2.0 - 2.2 mgd

Total Potential Annual Yield: Up to 15,200 afy (13.5 mgd)

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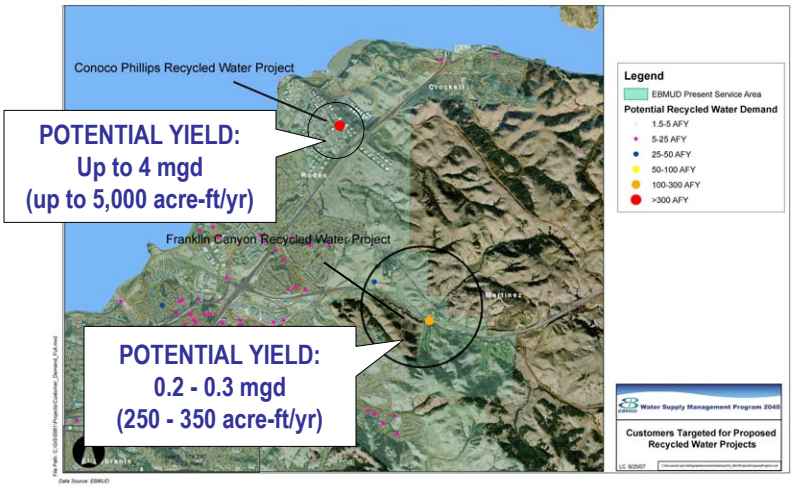
Water Supply Management Program 2040

Rodeo & Hercules Recycled Water Projects



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Water Supply Management Program 2040

Satellite Treatment Projects

Diablo Country Club	0.2 mgd
Moraga Country Club	01. - 0.2 mgd
Mountain View & St. Mary's Cemetery	0.1 - 0.2 mgd
Rolling Hills Cemetery	0.1 - 0.2 mgd
Rossmoor Country Club	0.1 - 0.2 mgd

Total Potential Annual Yield: Up to 1,100 afy (1 mgd)

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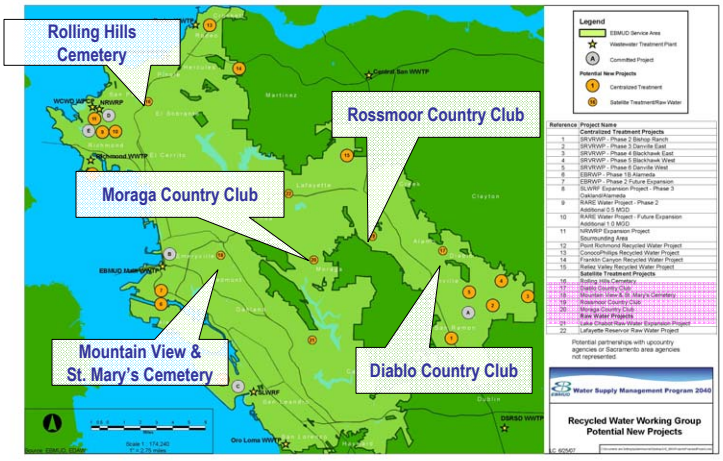
Water Supply Management Program 2040

Satellite Treatment Projects



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Water Supply Management Program 2040

Raw Water Projects

Lafayette Reservoir Raw Water Project	Up to 0.05 mgd
Lake Chabot Raw Water Expansion Project	0.1 – 0.2 mgd

Total Potential Annual Yield: Up to 300 afy (0.3 mgd)

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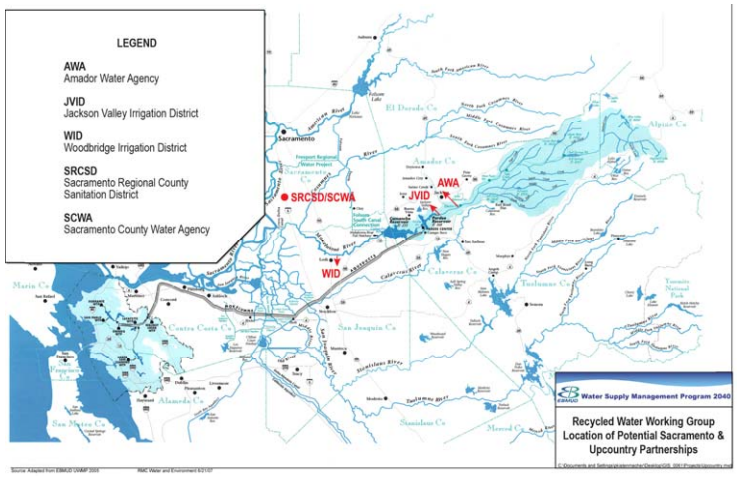
Water Supply Management Program 2040

Partnership with Upcountry/Sacramento Agencies



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Water Supply Management Program 2040

Partnership with Upcountry/Sacramento Agencies

Partner Agency	Potential Yield (annual, mgd or acre-ft/yr)
Amador Water Agency	1 mgd (1,100 acre-ft/yr)
Jackson Valley Irrigation Districts & Amador County Wastewater Agencies	0.2 - 0.3 mgd (200 - 300 acre-ft/yr)
Jackson Valley Irrigation Districts & Amador Water Agency/ future Joint Lake Camanche WWTP	1 mgd (1,100 acre-ft/yr)
Woodbridge Irrigation District	To Be Determined
Sacramento Regional County Sanitation District & Sacramento County Water Agency	**Up to 11.6 mgd (13,000 acre-ft/yr)**
TOTAL	**Up to 17 mgd (19,000 acre-ft/yr)**

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Water Supply Management Program 2040

5.d Supplemental Supply Component

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EBMUD Water Supply Management Program 2040

Supplemental Supply

Statewide
- Sites Reservoir
- Temperance Flat Reservoir
- Expanded Los Vaqueros Reservoir
- Semitropic Groundwater Bank

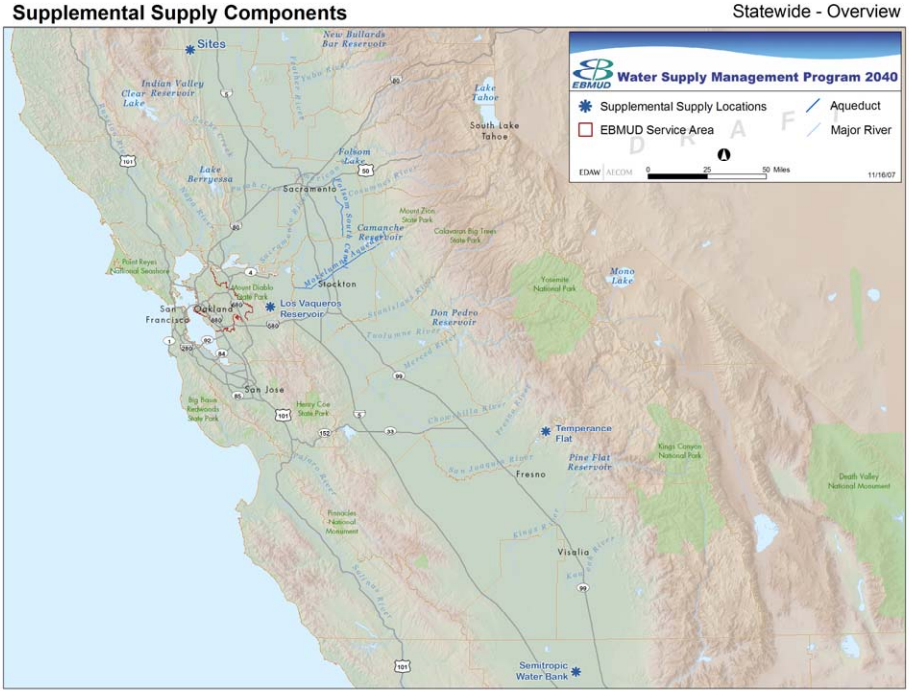
Central Valley
- Bixler/Delta Diversion
- Duck Creek
- Sacramento Basin Groundwater Banking/Exchange
- San Joaquin Basin Groundwater Banking/Exchange

Local (East Bay)
- Bayside GW - Phase 2
- Bollinger Canyon
- Buckhorn Canyon
- Cull Canyon
- Curry Canyon
- Fog Capture
- Kellogg Canyon
- Low Energy Application for Desalination (LEAD) at C&H Sugar
- Off-Shore Desalination
- Regional Desalination
- Water Bags

Upcountry
- Camanche
- Inter-Regional Conjunctive Use Project
- Lower Bear
- Middle Bar
- Pardee

← **Water Transfers** (short or long-term) →

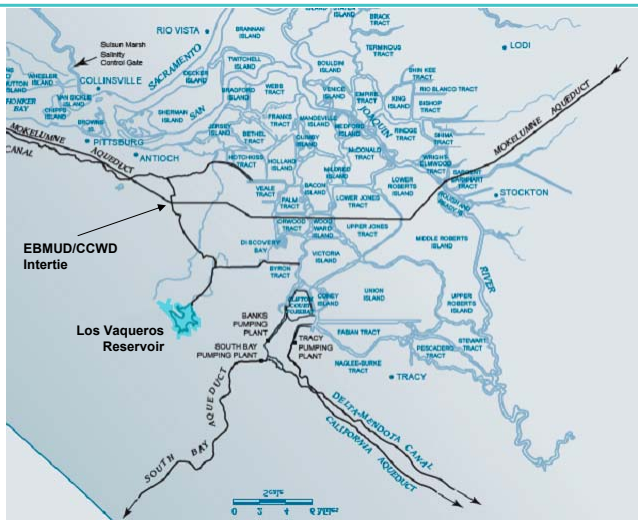
Supplemental Supply Components — Statewide - Overview



Water Supply Management Program 2040

Expanded Los Vaqueros Reservoir

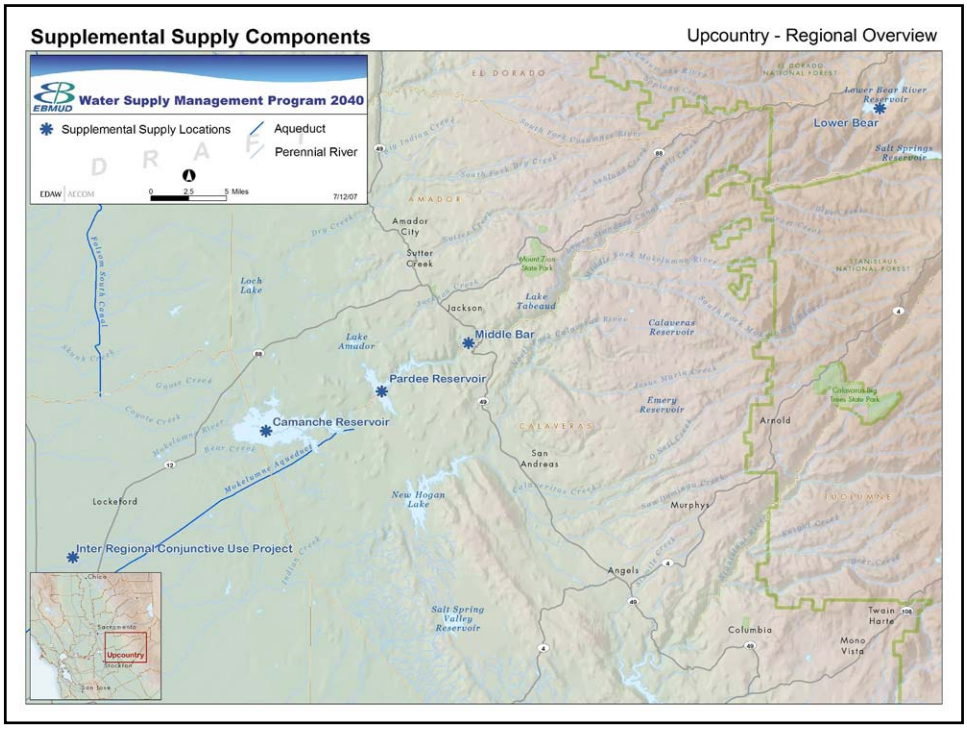
- Expand from 100 TAF to 275 TAF
- Environmental water supply
- Flood control
- Bay Area water supply
- Draft EIS/R & State Feasibility Study due April 2008, Final mid-2009

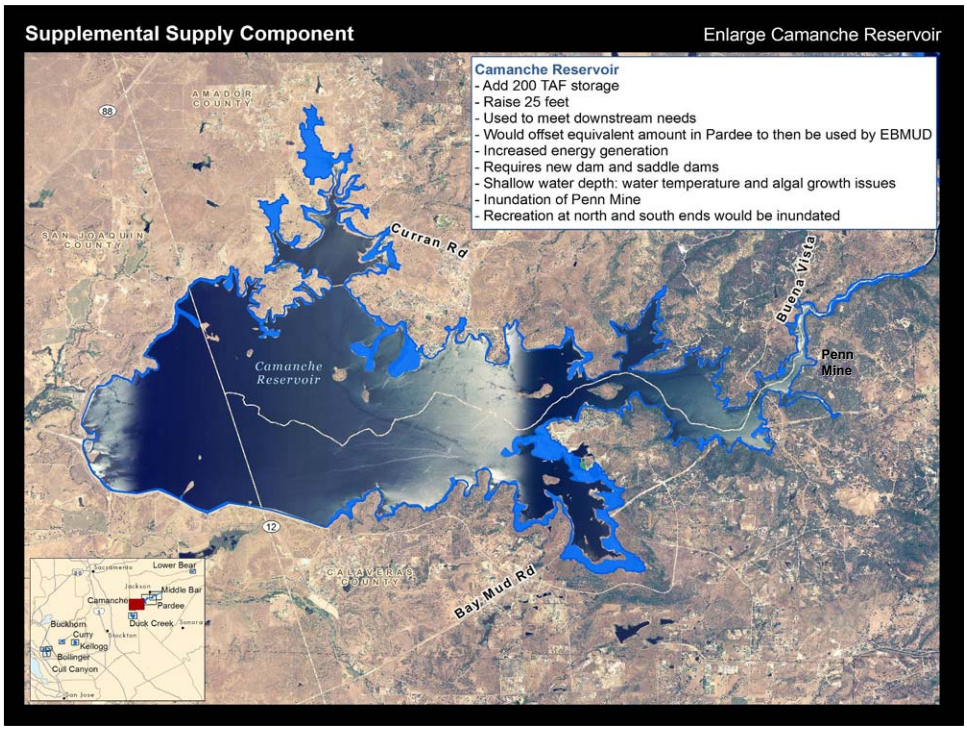


Water Supply Management Program 2040

Semitropic Water Bank

- Up to 70 TAF
- Dry year supplemental supply
- Water banking/water transfer arrangement
- Send EBMUD wet year transfer water to Semitropic
- During dry years, EBMUD would divert water via Freeport & Semitropic would use banked share

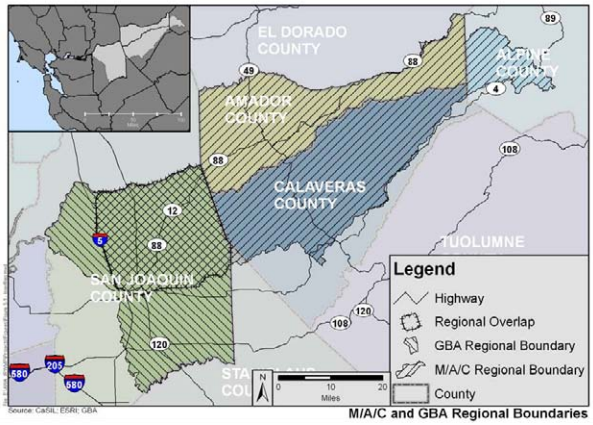

Supplemental Supply Components
Upcountry - Regional Overview
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
D R A F T
EDAW | AECOM
0 2.5 5 Miles
7/12/07
Lower Bear
Amador City
Sutter Creek
Jackson
Middle Bar
Pardee Reservoir
Camanche Reservoir
Inter Regional Conjunctive Use Project
Lockeford
San Andreas
Arnold
Murphys
Angels
Columbia
Twain Harte
Mono Vista
Upcountry


Supplemental Supply Component
Enlarge Camanche Reservoir
Camanche Reservoir
- Add 200 TAF storage
- Raise 25 feet
- Used to meet downstream needs
- Would offset equivalent amount in Pardee to then be used by EBMUD
- Increased energy generation
- Requires new dam and saddle dams
- Shallow water depth: water temperature and algal growth issues
- Inundation of Penn Mine
- Recreation at north and south ends would be inundated
AMADOR COUNTY
SAN JOAQUIN COUNTY
CALAVERAS COUNTY
Curran Rd
Buena Vista
Bay Mud Rd
Penn Mine
Camanche Reservoir
Lower Bear
Middle Bar
Pardee
Duck Creek
Buckhorn
Curry
Kellogg
Bellinger
Cull Canyon

EBMUD Water Supply Management Program 2040

Inter-Regional Conjunctive Use (IR-CUP)

- Annual production: 10 – 50 TAF
- Groundwater banking, exchange & transfer
- Amador, Calaveras & San Joaquin Counties & EBMUD
- Storage in E San Joaquin GW Basin



M/A/C and GBA Regional Boundaries

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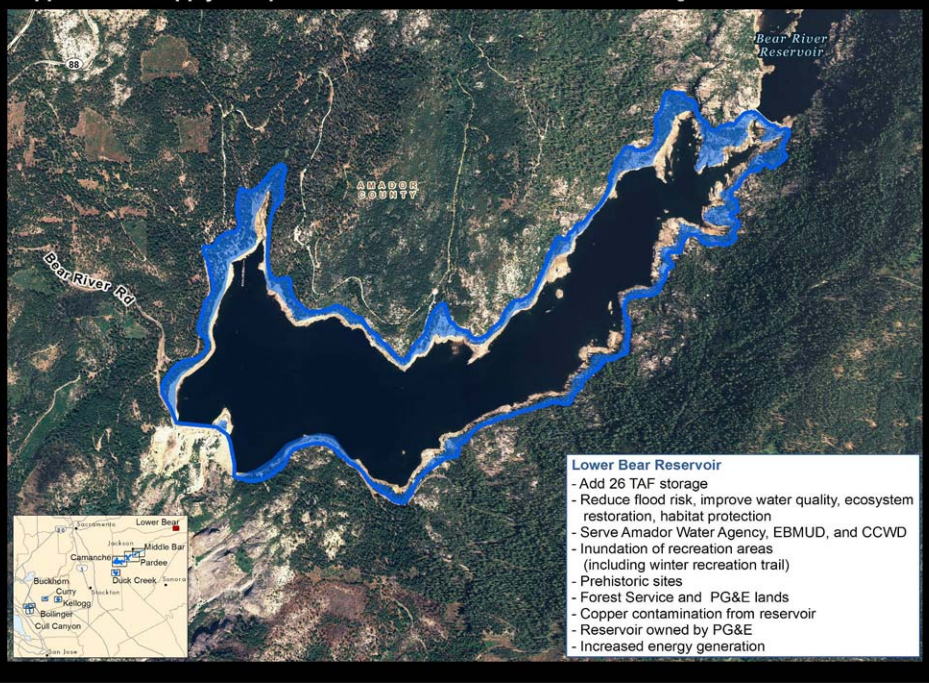
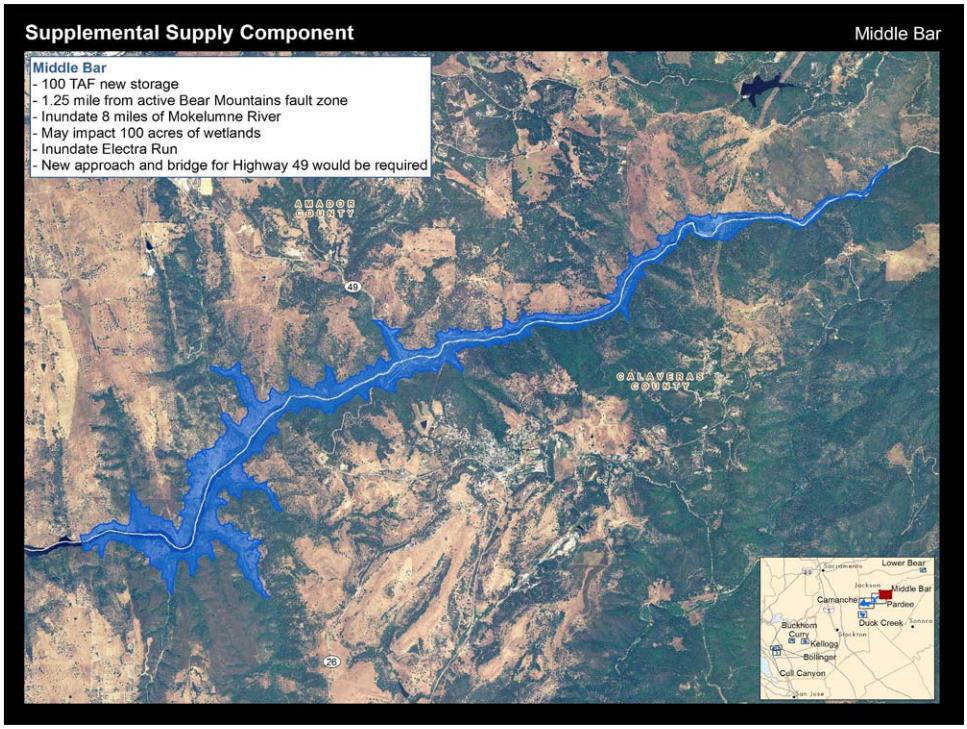
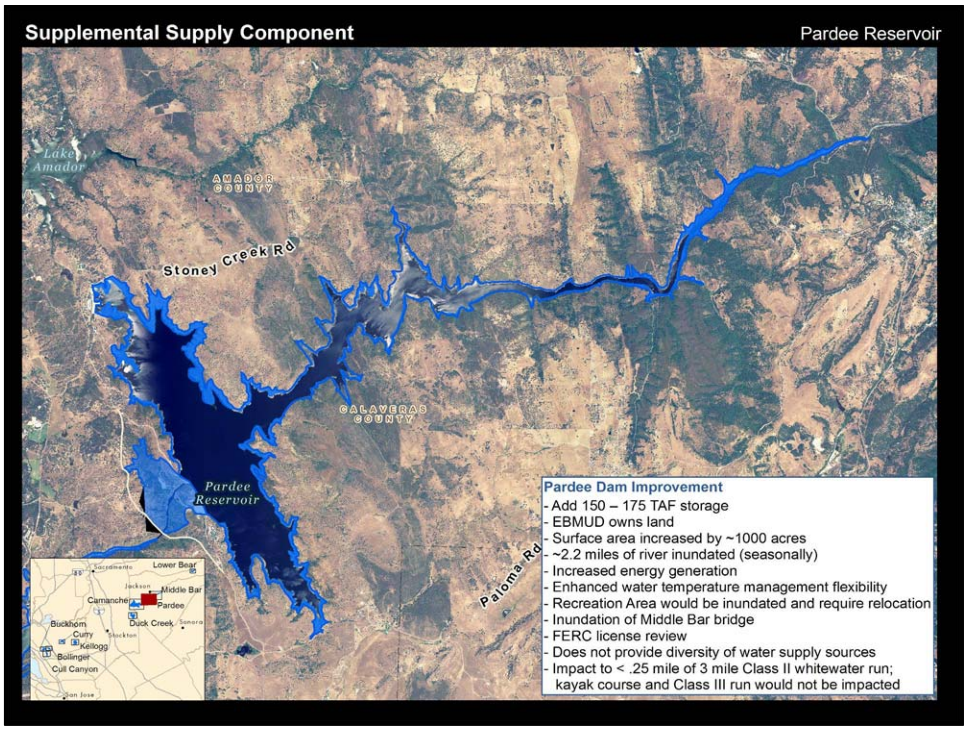
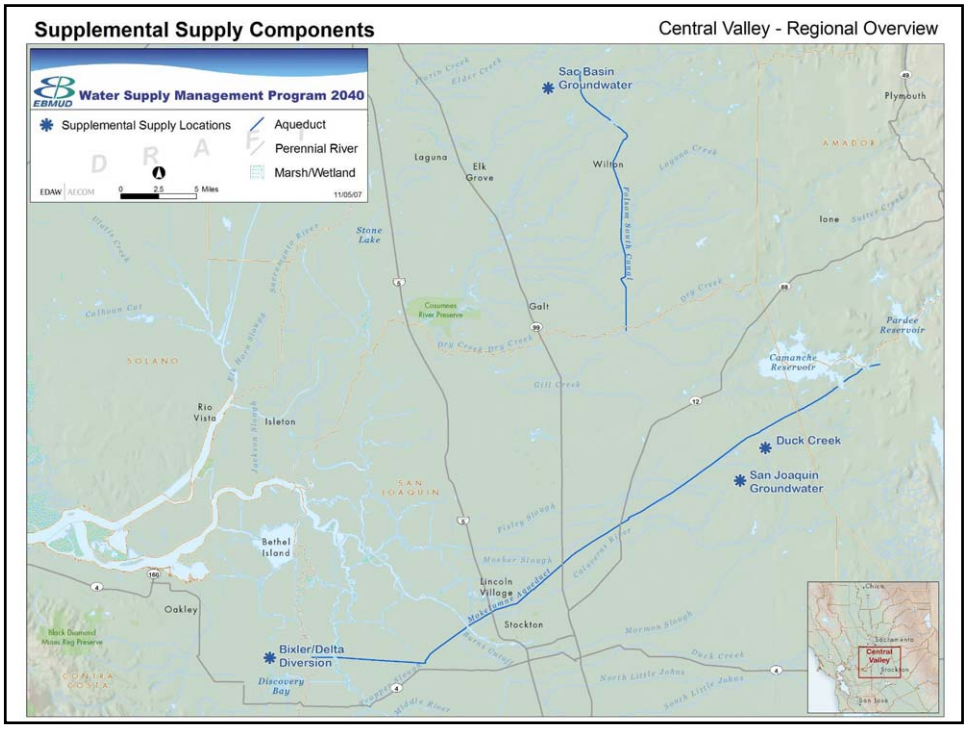
Supplemental Supply Component — Enlarge Lower Bear River Reservoir



Lower Bear Reservoir
- Add 26 TAF storage
- Reduce flood risk, improve water quality, ecosystem restoration, habitat protection
- Serve Amador Water Agency, EBMUD, and CCWD
- Inundation of recreation areas (including winter recreation trail)
- Prehistoric sites
- Forest Service and PG&E lands
- Copper contamination from reservoir
- Reservoir owned by PG&E
- Increased energy generation


Supplemental Supply Component
Middle Bar
Middle Bar
- 100 TAF new storage
- 1.25 mile from active Bear Mountains fault zone
- Inundate 8 miles of Mokelumne River
- May impact 100 acres of wetlands
- Inundate Electra Run
- New approach and bridge for Highway 49 would be required
AMADOR COUNTY
CALAVERAS COUNTY
49
26
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bellinger
Cull Canyon

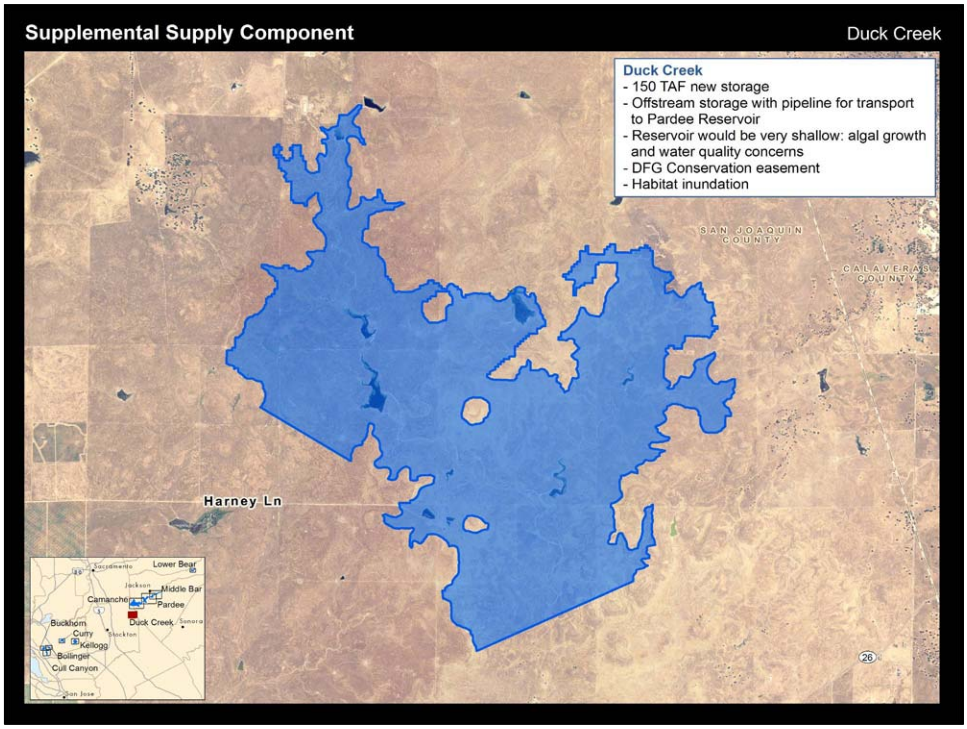

Supplemental Supply Component
Pardee Reservoir
Lake Amador
AMADOR COUNTY
Stoney Creek Rd
CALAVERAS COUNTY
Pardee Reservoir
Paloma Rd
Pardee Dam Improvement
- Add 150 – 175 TAF storage
- EBMUD owns land
- Surface area increased by ~1000 acres
- ~2.2 miles of river inundated (seasonally)
- Increased energy generation
- Enhanced water temperature management flexibility
- Recreation Area would be inundated and require relocation
- Inundation of Middle Bar bridge
- FERC license review
- Does not provide diversity of water supply sources
- Impact to < .25 mile of 3 mile Class II whitewater run; kayak course and Class III run would not be impacted
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bellinger
Cull Canyon



Water Supply Management Program 2040

Bixler/Delta Diversion

- Existing but unused facilities: 2 pumping plants & intake canal
- If treated on-site, requires new facility but allows unrestricted distribution
- If not treated on-site, restricted distribution options



EBMUD Water Supply Management Program 2040

Sacramento County GW Banking/Exchange

- EBMUD, Sacramento County Water Agency, Sacramento Groundwater Authority
- Groundwater Storage Potential: TBD
- Convey via Freeport Regional Water Project
- Components: recharge ponds, extraction wells, treatment plant, pipeline, pump station, intertie
- Institutional challenges

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EBMUD Water Supply Management Program 2040

San Joaquin County GW Banking/Exchange

- Approximately 2 Mil AF of storage potentially available
- The "10-well project" considered
  - Injecting 40 TAF per year
  - Extracting 25 TAF per year (dry years)
- Direct Recharge Project (not in-lieu recharge)
- Diversion at Mokelumne Aqueduct (rather than a new diversion structure downstream)
- Recharge via injection wells
- Extracted water back to EBMUD system via the same recharge distribution system pipeline & via same wells
- Institutional challenges

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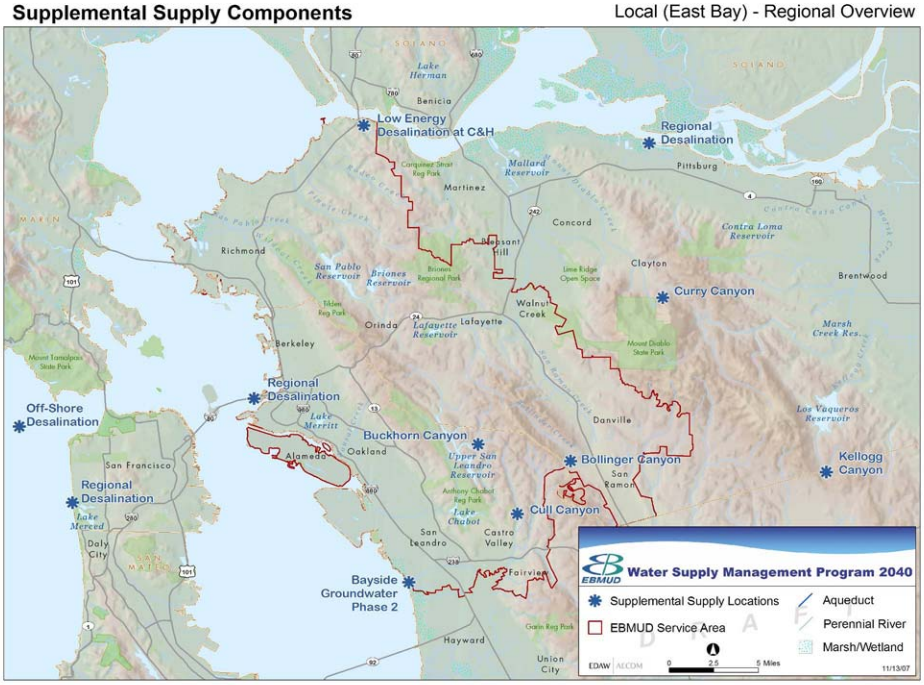
Supplemental Supply Components — Local (East Bay) - Regional Overview



EBMUD Water Supply Management Program 2040

Bayside Groundwater Phase 2

- 5 – 10 TAF (dry years)
- Up to 4 additional wells, transmission pipeline, expanded monitoring system & treatment
- Concerns regarding groundwater basin impacts, water quality, & environmental justice
- New EIR required

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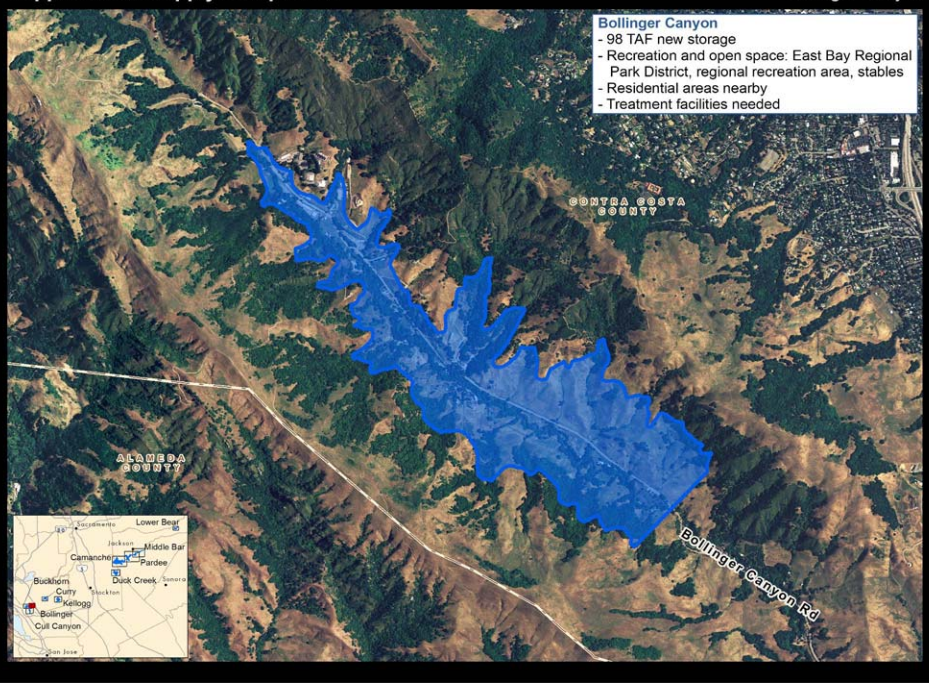
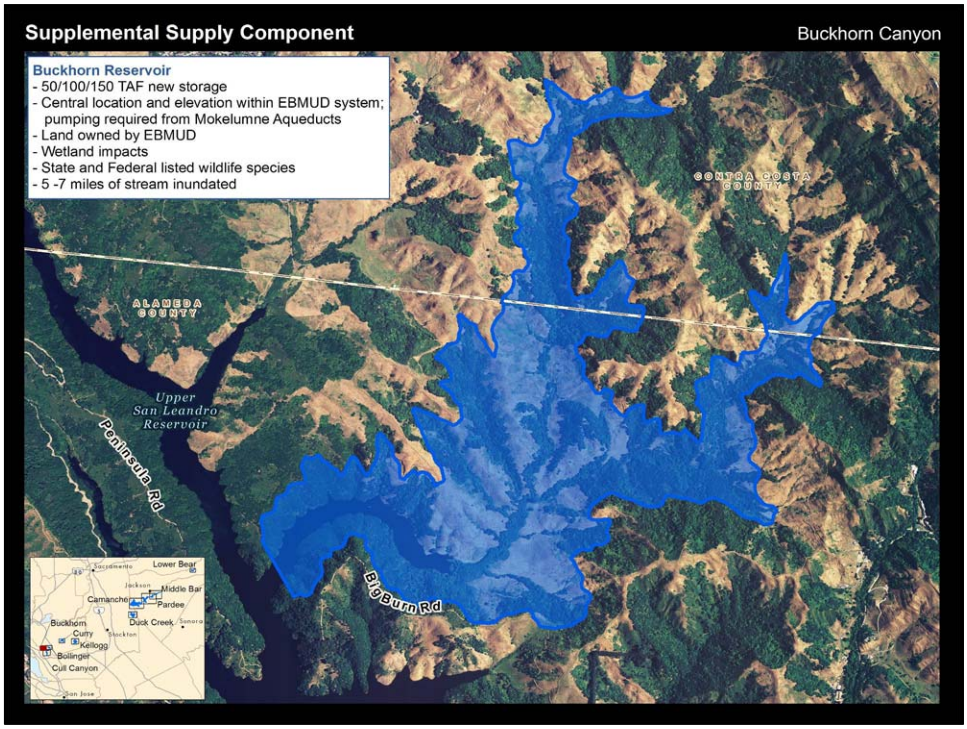
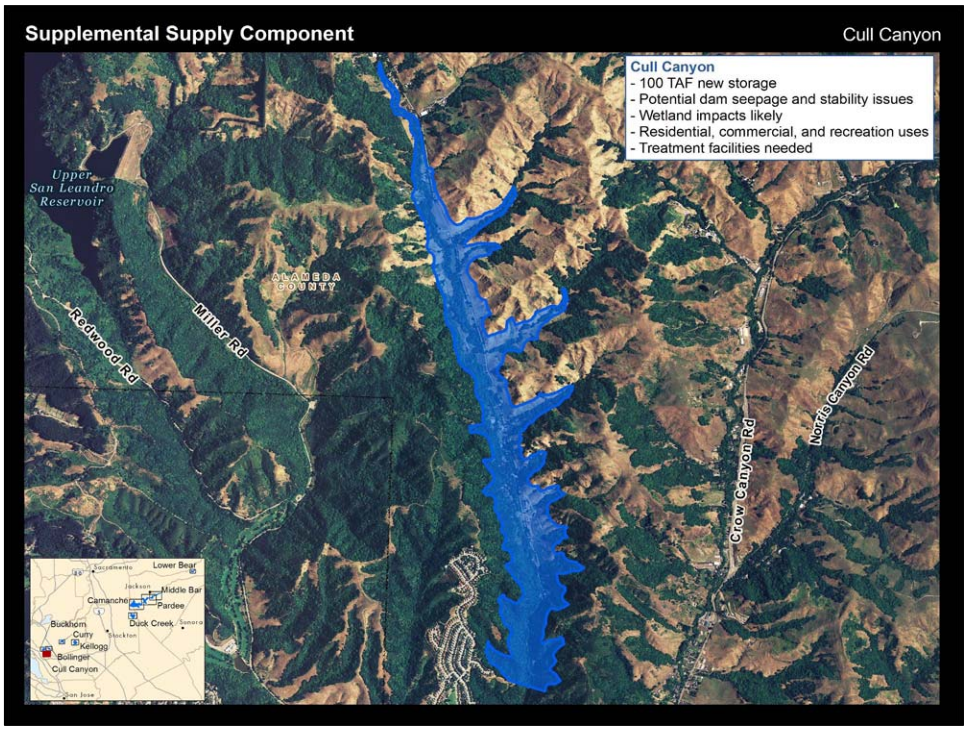
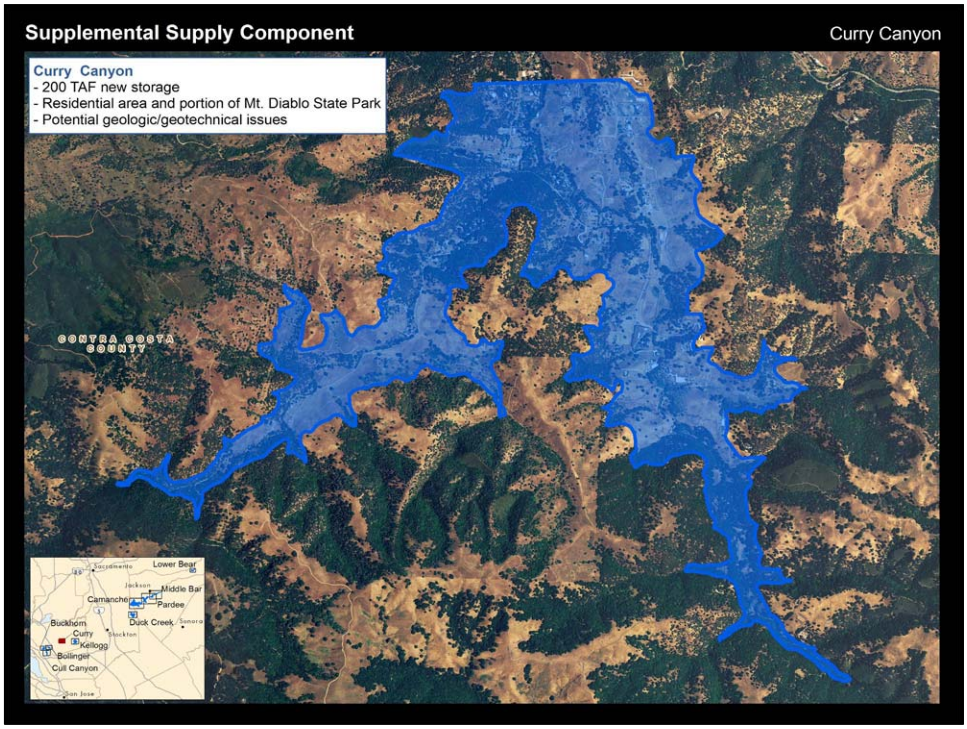
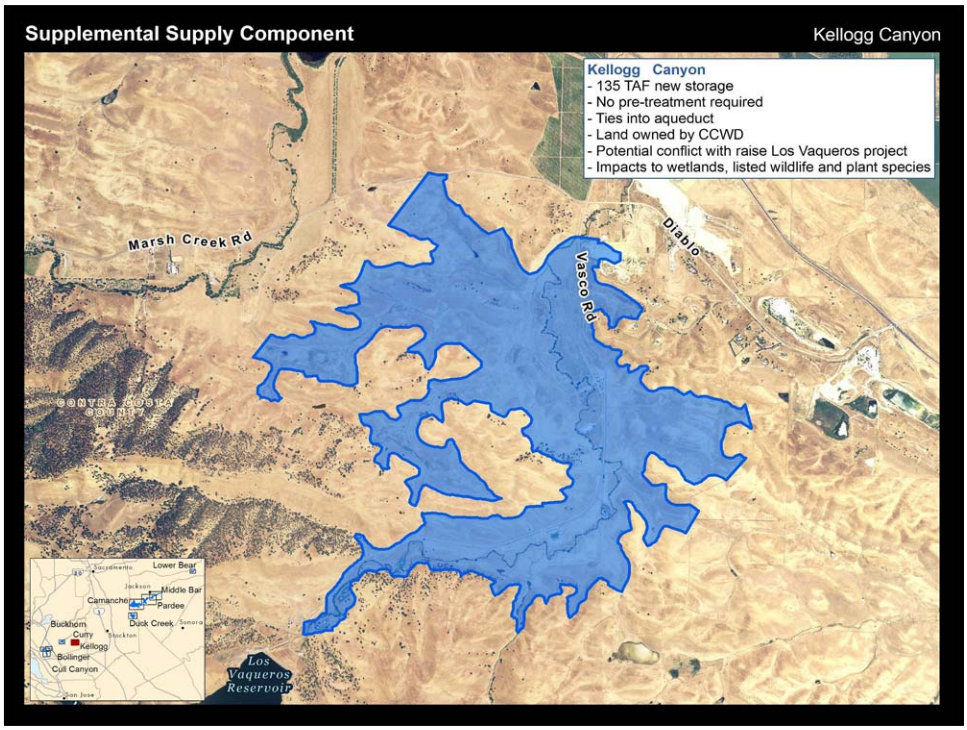
Supplemental Supply Component — Bollinger Canyon




Supplemental Supply Component
Buckhorn Canyon
Buckhorn Reservoir
- 50/100/150 TAF new storage
- Central location and elevation within EBMUD system; pumping required from Mokelumne Aqueducts
- Land owned by EBMUD
- Wetland impacts
- State and Federal listed wildlife species
- 5 -7 miles of stream inundated
CONTRA COSTA COUNTY
ALAMEDA COUNTY
Upper San Leandro Reservoir
Peninsula Rd
Big Burn Rd
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Cull Canyon
Cull Canyon
- 100 TAF new storage
- Potential dam seepage and stability issues
- Wetland impacts likely
- Residential, commercial, and recreation uses
- Treatment facilities needed
Upper San Leandro Reservoir
ALAMEDA COUNTY
Redwood Rd
Miller Rd
Crow Canyon Rd
Norris Canyon Rd
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Curry Canyon
Curry Canyon
- 200 TAF new storage
- Residential area and portion of Mt. Diablo State Park
- Potential geologic/geotechnical issues
CONTRA COSTA COUNTY
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon


Supplemental Supply Component
Kellogg Canyon
Kellogg Canyon
- 135 TAF new storage
- No pre-treatment required
- Ties into aqueduct
- Land owned by CCWD
- Potential conflict with raise Los Vaqueros project
- Impacts to wetlands, listed wildlife and plant species
Marsh Creek Rd
Vasco Rd
Diablo
CONTRA COSTA COUNTY
Lower Bear
Middle Bar
Pardee
Camanche
Duck Creek
Buckhorn
Curry
Kellogg
Bollinger
Cull Canyon
Los Vaqueros Reservoir

Water Supply Management Program 2040

Low-Energy Application Desalination (C&H)

- Produce 1.5 MGD for use in plant
- Potable water offset
- Energy for desalination plant from recovered steam
- Within existing footprint
- Intake/discharge issues

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Water Supply Management Program 2040

Off-shore Desalination

- Desalination facility on ship provides mobility & flexibility
- Tie-ins to conveyance systems needed
- Unproven technology

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Water Supply Management Program 2040

Regional Desalination

- 4 partner agencies: EBMUD, SFPUC, CCWD, SCVWD
- 22 TAF per year EBMUD yield (dry years)
- Provides diversity of water source, flexibility
- Brine discharge
- Impingement & entrainment
- High energy consumption

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Water Supply Management Program 2040

Water Transfers

- Potential Water Transfer Partners

1.	**Contra Costa Water District**	**9.**	**Glen-Colusa Irrigation District***
2.	Santa Clara Valley Water District	**10.**	**Plumas County***
3.	San Francisco PUC	**11.**	**City of Folsom***
4.	Alameda County Water Agency	12.	Placer County
5.	Zone 7 Water Agency	13.	Butte County
6.	**City of Lodi***	14.	Yuba County
7.	Amador Water Agency	15.	Western Canal Water District
8.	Woodbridge Irrigation District	**16.**	**Individual Agricultural Users***

* In active discussions
(short, long, or permanent water transfers)

- An indication as to Level of Transfer Activity in 2006

CVP Sac River Division Transfers: 36 short-term/ 2 long-term/ 70,000AF
CVP Delta division Transfers: 26 short-term/ no long-term/ 98,000AF

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Water Supply Management Program 2040

Water Transfers

- Northern California Transfers through Freeport
  - Additional treatment required for all transfers through Freeport
  - 170 TAF available capacity in 3-year drought
- Transfer market
  - Impacted by dry conditions
  - "Wanger" decision limits north to south transfers through Delta

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Water Supply Management Program 2040

Supplemental Supply

Statewide
- Sites Reservoir
- Temperance Flat Reservoir
- Expanded Los Vaqueros Reservoir
- Semitropic Groundwater Bank

Central Valley
- Bixler/Delta Diversion
- Duck Creek
- Sacramento Basin Groundwater Banking/Exchange
- San Joaquin Basin Groundwater Banking/Exchange

Local (East Bay)
- Bayside GW - Phase 2
- Bollinger Canyon
- Buckhorn Canyon
- Cull Canyon
- Curry Canyon
- Fog Capture
- Kellogg Canyon
- Low Energy Application for Desalination (LEAD) at C&H Sugar
- Off-Shore Desalination
- Regional Desalination
- Water Bags

Upcountry
- Camanche
- Inter-Regional Conjunctive Use Project
- Lower Bear
- Middle Bar
- Pardee

← **Water Transfers** (short or long-term) →

EBMUD Water Supply Management Program 2040

Next Steps: Overall

- Complete compilation of cost data for all project components - December
- Apply screening criteria to all project components – December & January
- Rank & organize project components into Most to Least Promising – December & January
- Present screened & evaluated project components at February 2008 Board Workshop
- Begin compiling project components into Portfolios – January & February 2008

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EBMUD Water Supply Management Program 2040

Community Liaison Committee

Fifth Meeting

March 11, 2008

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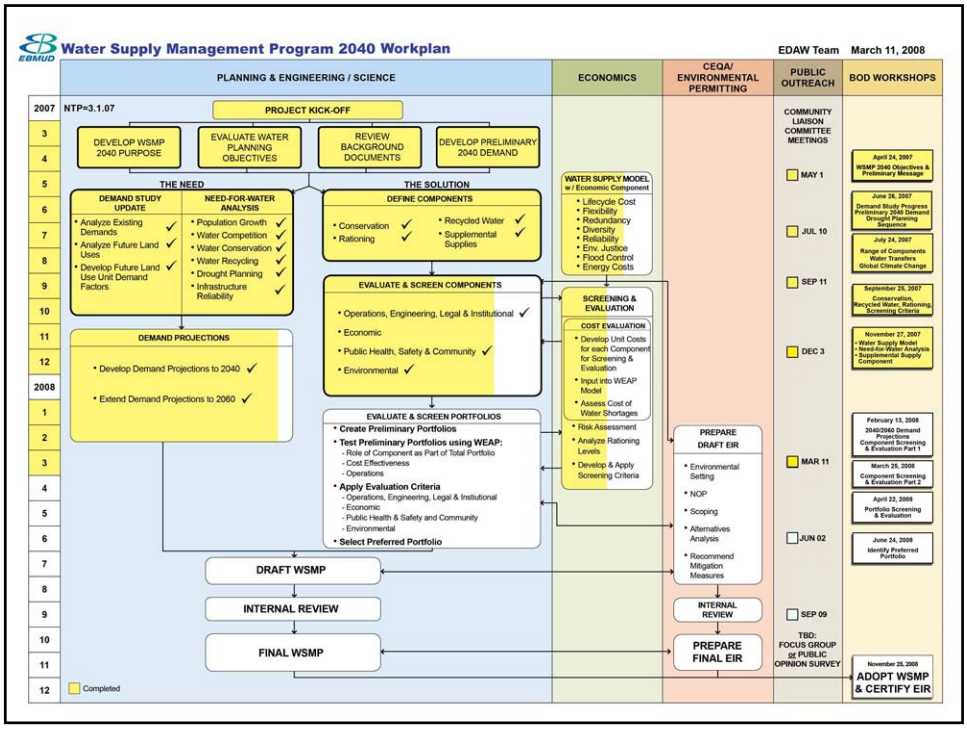
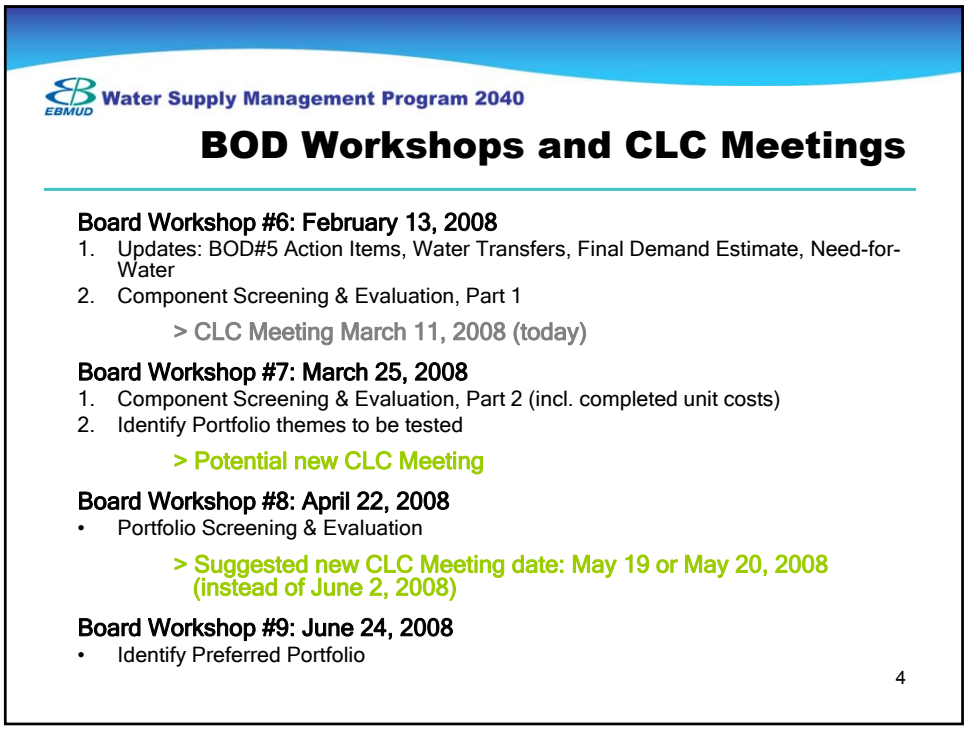
EBMUD Water Supply Management Program 2040

Agenda

1.	Welcome and Introductions	
2.	WSMP 2040 Progress	30 min
3.	Updates	
	a. Water Transfers	
	b. Final Demand Projection	
	c. Need for Water Results	
	Q&A	
4.	Component Screening & Evaluation:	
	a. Supplemental Supply - Q&A	20 min
	b. Recycled & Raw Water - Q&A	20 min
	c. Conservation - Q&A	20 min
5.	Other Comments or Questions	
6.	Public Comment	
7.	Next Meeting Dates	

2


Water Supply Management Program 2040 Workplan
EDAW Team
March 11, 2008
PLANNING & ENGINEERING / SCIENCE
ECONOMICS
CEQA/ ENVIRONMENTAL PERMITTING
PUBLIC OUTREACH
BOD WORKSHOPS
NTP=3.1.07
PROJECT KICK-OFF
DEVELOP WSMP 2040 PURPOSE
EVALUATE WATER PLANNING OBJECTIVES
REVIEW BACKGROUND DOCUMENTS
DEVELOP PRELIMINARY 2040 DEMAND
THE NEED
THE SOLUTION
DEMAND STUDY UPDATE
NEED-FOR-WATER ANALYSIS
DEFINE COMPONENTS
EVALUATE & SCREEN COMPONENTS
DEMAND PROJECTIONS
EVALUATE & SCREEN PORTFOLIOS
DRAFT WSMP
INTERNAL REVIEW
FINAL WSMP
WATER SUPPLY MODEL w / Economic Component
SCREENING & EVALUATION
COST EVALUATION
PREPARE DRAFT EIR
INTERNAL REVIEW
PREPARE FINAL EIR
COMMUNITY LIAISON COMMITTEE MEETINGS
MAY 1
JUL 10
SEP 11
DEC 3
MAR 11
JUN 02
SEP 09
TBD: FOCUS GROUP or PUBLIC OPINION SURVEY
ADOPT WSMP & CERTIFY EIR
Completed


Water Supply Management Program 2040
BOD Workshops and CLC Meetings
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> Suggested new CLC Meeting date: May 19 or May 20, 2008 (instead of June 2, 2008)
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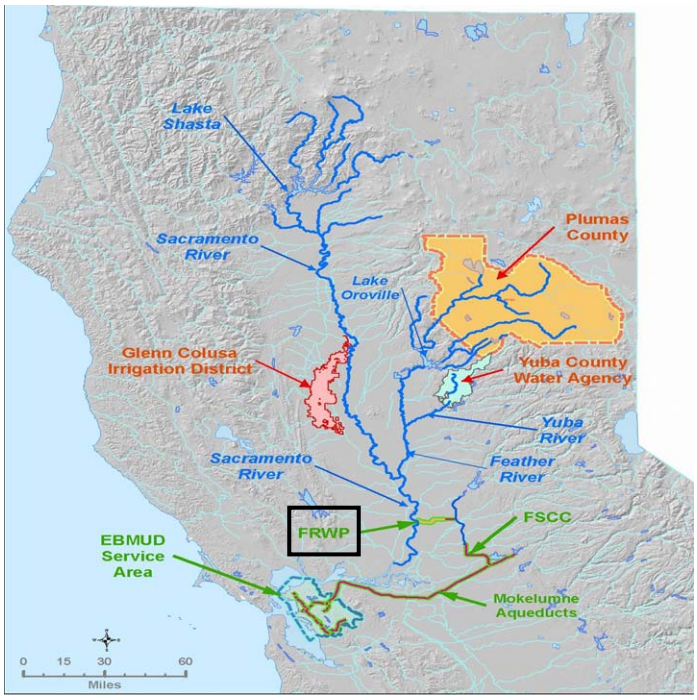
• Identify Preferred Portfolio
4

Water Supply Management Program 2040

Updates

Northern California Water Transfers



Red Clover Creek Meadow Restoration

Water Supply Management Program 2040

Water Transfers Next Steps

- GCID
  - Evaluating range of water transfer frequency, optimal call period and transfer volume/timing.
- Yuba County
  - February 6 meeting follow-up
- Plumas County
  - IVCSD to gauge community interest
  - EBMUD to furnish list of questions on project feasibility
    - Lake Oroville pass - through
    - Quantities available and timing
    - Community acceptance
    - Specific sites

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EBMUD Water Supply Management Program 2040

Demand Study

Final Demand Projections

EBMUD Water Supply Management Program 2040

Final Demand Projections

- Baseline Assumptions & Results
- Projections by Region
- Next Steps

Water Supply Management Program 2040

Demand Projections: Final Results

	2005	2010	2015	2020	2025	2030	2040
System Input (normalized - unadjusted)	232	246	261	275	286	299	306
Baseline Conservation*	-18.0	-22.5	-22.5	-22.5	-22.5	-22.5	-22.5
Baseline Recycled Water*	-6.0	-9.3	-9.3	-9.3	-9.3	-9.3	-9.3
System Input (adjusted)	**208**	214	229	243	254	267	274

*WSMP 2040 assumptions: conservation and recycled water
Preliminary 2040 Demands: 258 mgd

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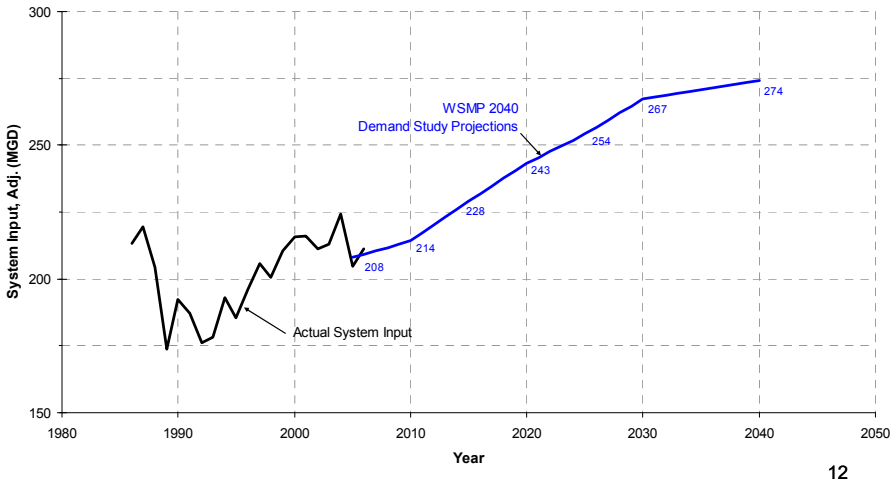
Water Supply Management Program 2040

Demand Projections: Final Results



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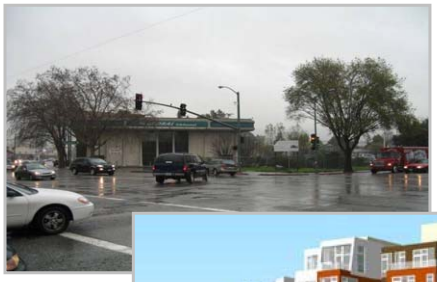
Water Supply Management Program 2040

Increasing Densities



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Water Supply Management Program 2040

Central Area - Aggressive Redevelopment

OAKLAND 10k INITIATIVE
10,000 RESIDENTS DOWNTOWN

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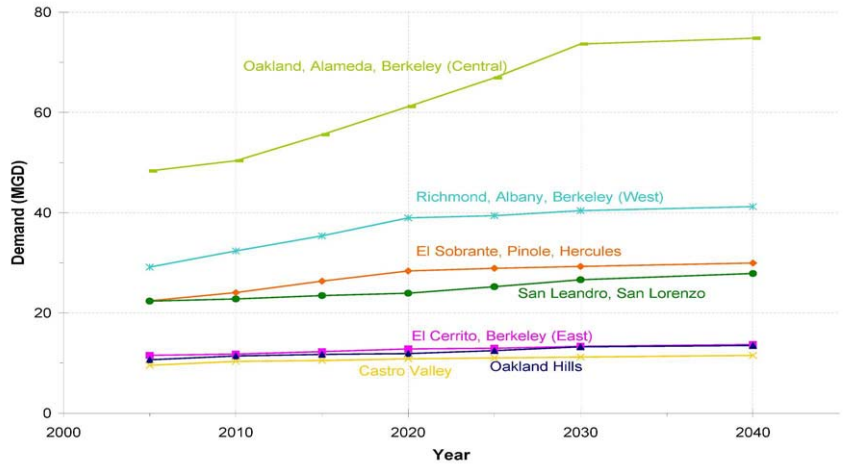
Water Supply Management Program 2040

Demand Projections: Regions West of Hills



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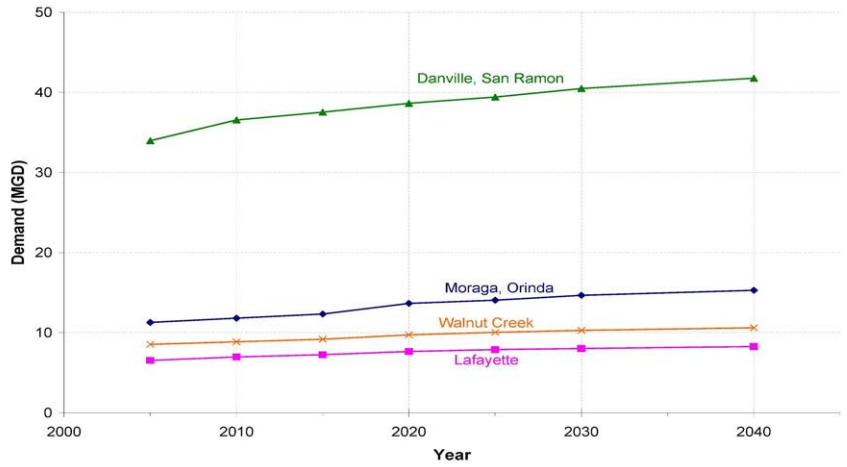
Water Supply Management Program 2040

Demand Projections: Regions East of Hills



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Water Supply Management Program 2040

Need for Supplemental Water

Results with Final Demand Projection

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Water Supply Management Program 2040

Assumptions

- 2040 demand estimate = 274 MGD
- Demand estimate assumes:
  - Recycled water projects through 2010 = 9.3 MGD
  - Conservation programs through 2008 = 22.5 MGD

= 306 MGD

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Water Supply Management Program 2040

Need for Supplemental Water Supplies in 2040 during Drought Planning Sequence

Uses Final Demand Projection of 274 MGD

Maximum rationing	Gross Annual Average Customer Demand (MGD)	Average Annual Need for Water (MGD)	Need for Water over 3 years (TAF)[b]
25%	306[a]	57	194
15%	306	77	259
10%	306	87	294
0%	306	107	359

a. *Includes 274 MGD + 31 MGD for ongoing recycling and conservation*

b. *Estimated values*

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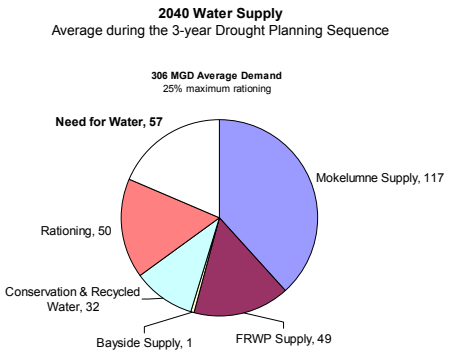
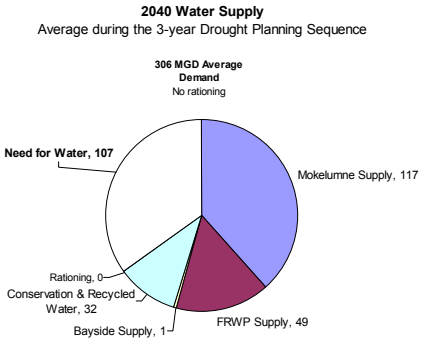
Water Supply Management Program 2040

2040 Water Supply Rationing at 0% & 25%





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Water Supply Management Program 2040

Component Screening & Evaluation

Part 1

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Water Supply Management Program 2040

Water Supply Portfolios

Building a Portfolio from Project Components

Components			
Conservation	Rationing	Recycled Water	Supp. Supply
A	0%	1	1
B	10%	2	2
C	15%	3	3
D	25%	4	4
E		5	5
		6	6
		⋮	⋮
		22	25

Example Portfolio 1

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EBMUD Water Supply Management Program 2040

Supplemental Supply Component

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Supplemental Supply Components Statewide - Overview

Water Supply Management Program 2040

Recycled Water Component

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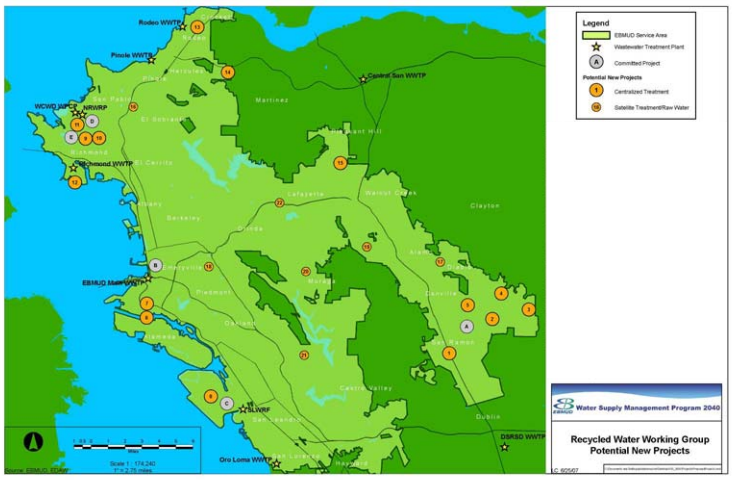
Water Supply Management Program 2040

Potential Projects within EBMUD Service Area



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Water Supply Management Program 2040

Conservation Component

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Water Supply Management Program 2040

Conservation Approach
2009 & beyond

- Analyzed 53 individual conservation measures beyond plumbing codes
- Range of analysis: from natural savings to maximum voluntary conservation potential
- Assess technology, behavior and leak repair
- Assess implementation barriers (e.g. customer acceptance, market saturation, cost)
- Range of market saturation by measure: <1% to 95%

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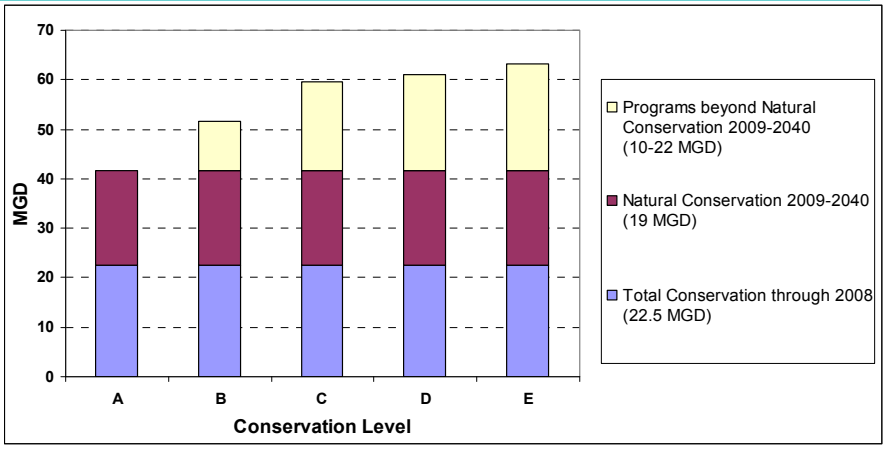
Water Supply Management Program 2040

Conservation Ranges



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Water Supply Management Program 2040

Conservation Level A - E Comparison

Level	Description	# of Measures[1]	2040 Water Savings (MGD)	% Market Saturation	Average Incremental Dry Year Unit Cost ($/AF) [2]
A	Natural savings	11	19	10-50%	NA
B	Natural savings + 10	39	29	10-65%	$500
C	Current program equivalent	51	37	15-75%	$3,600
D	Current program equivalent + 2	53	39	20-80%	$6,300
E	Maximum voluntary program	58	41	25-95%	$11,300

[1] Estimated range of multiple measures/products across all customer sectors.
[2] Preliminary number based on need for water in 3 of 10 years.

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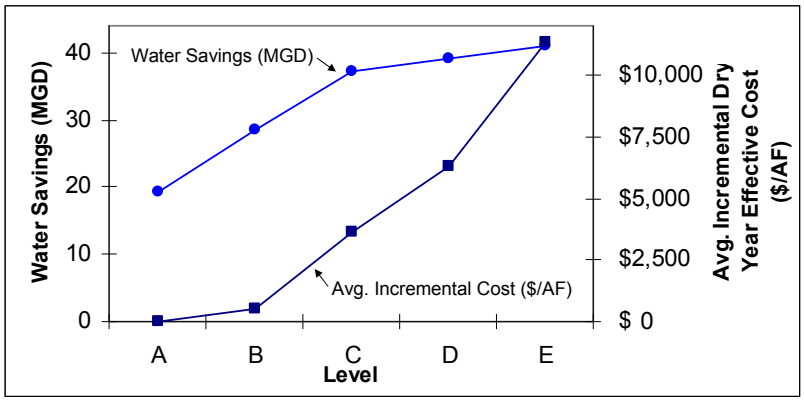
Water Supply Management Program 2040

Conservation Level A - E Comparison
Preliminary Cost Evaluation



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Water Supply Management Program 2040

Level A: Natural Savings

11 Conservation Measures[1]	2040 Water Savings (MGD)	$/AF[2]
Toilet standards	11.0	NA
Urinal standards	0.54	NA
Showerhead standards	0.56	NA
Clotheswasher standards	7.1	NA
TOTAL	**19.2**	NA

[1] Estimated range of multiple measures/products across all customer sectors.
[2] Plumbing code requirement, therefore cost is not applicable.

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Water Supply Management Program 2040

Level B: Natural Savings + 10
Level A + 28 New Measures

- MF surveys
- MF surveys with automated metering
- Smart irrigation controller rebates
- Commercial surveys with automated metering
- Irrigation Water Budgets
- Irrigation water budgets w/automated metering
- Retrofit on resale toilet ordinance (SF) I*
- Retrofit on resale toilet ordinance (MF) I*
- MF submeter incentive
- Res. clotheswasher rebates I*
- Comm. clotheswasher rebates I & II*
- Dental Vacuum Pumps
- Water Brooms
- Artificial turf sports fields
- Public Education
- New development requirements:
  - Automated metering
  - High efficiency toilets
  - High efficiency washers
  - High efficiency faucets, showerheads
  - MF submetering
  - Smart irrigation controllers
  - Hot water on demand
  - Landscape and irrigation standards
  - New commercial urinals
  - Commercial plan review
  - High efficiency dishwashers
  - Plan review for new CII

**** Multiple levels of market penetration***

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Water Supply Management Program 2040

Level B: Natural Savings + 10

39 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Incremental Dry-Year Unit Cost ($/AF) [2]
Level A (Natural Savings)	19	
Level B	10	
TOTAL	**29**	**$500**

[1] Estimated range of multiple measures/products across all customer sectors.
[2] Preliminary number based on need for water in 3 of 10 years.

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Water Supply Management Program 2040

Level C: Current Program Equivalent

Level B + 12 New Measures

- SF Surveys
- SF Surveys w/automated metering
- CII Surveys
- Commercial/Institutional/Industrial equipment rebates
- Condo Surveys
- Condo Surveys w/automated metering
- High efficiency toilet rebates I & II*
- Irrigation Water Surveys
- SF garbage disposal incentive
- Leak Detection & Repair Reduction II*
- Artificial Turf SF Residential

**** Multiple levels of Market Penetration***

51 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Incremental Dry-Year Unit Cost ($/AF) [2]
Level B (39 measures)	29	
Level C	8	
TOTAL	37	$3,600

[1] *Estimated range of multiple measures/products across all customer sectors.*
[2] *Preliminary number based on need for water in 3 of 10 years.*

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Water Supply Management Program 2040

Level D: Current Program + 2

Level C + 2 New Measures

- Required Plumbing for Future Graywater Use in SF Residential
- Financial Incentives/Rebates for Irrigation Upgrades

53 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Incremental Dry-Year Unit Cost ($/AF) [2]
Level C (51 measures)	37	
Level D	2	
TOTAL	39	$6,300

[1] *Estimated range of multiple measures/products across all customer sectors.*
[2] *Preliminary number based on need for water in 3 of 10 years.*

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Water Supply Management Program 2040

Level E: Maximum Voluntary Program

Level D + 5 New Measures

- Graywater retrofit incentive (SF)
- Graywater incentive for new construction (SF)
- High Efficiency Urinal Rebate (<0.25 gal)
- Financial Incentives for Irrigation Upgrades (Extensive)
- Cisterns

58 Conservation Measures[1]	2040 Water Savings (MGD)	Avg. Marginal Unit Cost ($/AF) [2]
Level D (53 measures)	39	
Level E	2	
TOTAL	**41**	**$11,300**

[1] Estimated range of multiple measures/products across all customer sectors.
[2] Preliminary number based on need for water in 3 of 10 years.

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Water Supply Management Program 2040

BOD Workshops and CLC Meetings

Board Workshop #6: February 13, 2008
1. Updates: BOD#5 Action Items, Water Transfers, Final Demand Estimate, Need-for-Water
2. Component Screening & Evaluation, Part 1

> CLC Meeting March 11, 2008 (today)

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Board Workshop #9: June 24, 2008
- Identify Preferred Portfolio

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Water Supply Management Program 2040

Community Liaison Committee
Meeting #6
April 7, 2008

1

Water Supply Management Program 2040

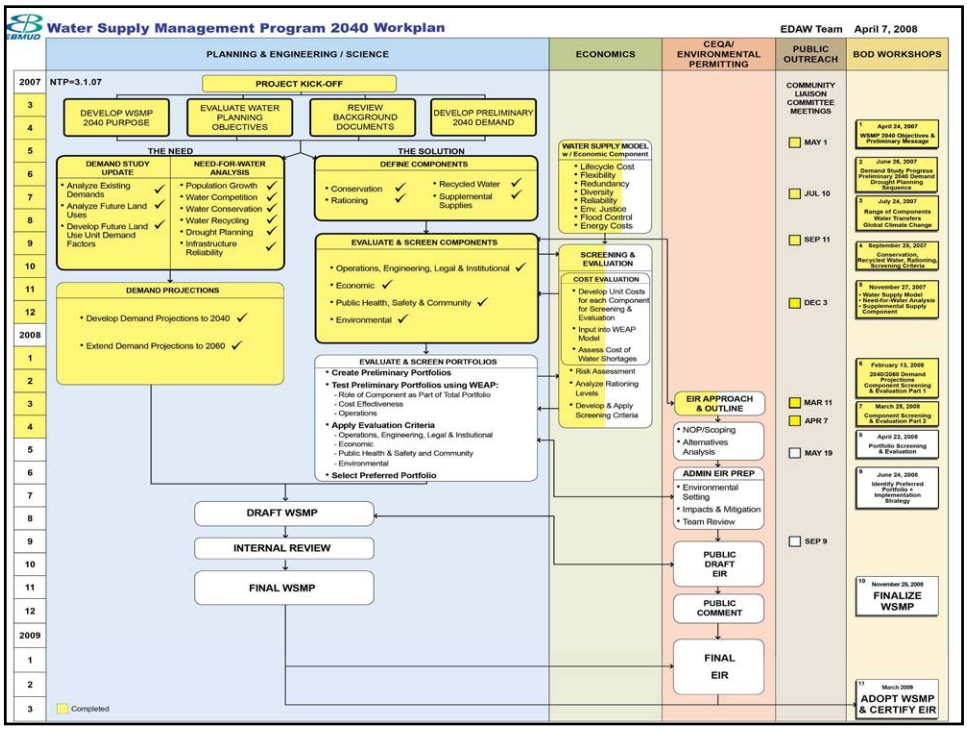
Agenda

1. Project Update **40 min**
   - Workplan & Schedule
   - Summary of Previous Workshops
   - Climate Change Sensitivity Analysis Results
   - Rationing Component
   - Cost of Water Shortage
2. Component Screening Part 2, with Component Costs **40 min**
3. Portfolio Building **40 min**

2

EBMUD Water Supply Management Program 2040

Project Update



Water Supply Management Program 2040

Summary of Previous Workshops

Board Workshop #1: April 24, 2007
1. Team Organization & Workplan
2. WSMP 2020 Overview
3. 1993 to Present
4. WSMP 2040 Purpose & Planning Objectives
5. Public Outreach Plan

Board Workshop #2: June 26, 2007
1. Demands Study Status Report & Preliminary Demand Estimate
2. Drought Planning Sequence Evaluation
3. Evaluation Criteria – Approach

Board Workshop #3: July 24, 2007
1. Water Transfers
2. Range of Components
3. Global Climate Change – WSMP 2040 Approach

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Water Supply Management Program 2040

Summary of Previous Workshops (continued)

Board Workshop #4: September 25, 2007
1. Evaluation Criteria
2. Conservation Component
3. Rationing Component
4. Recycled Water Component

Board Workshop #5: November 27, 2007
1. Conservation Program – more detail on programs as requested at BOD#4
2. Water Supply Model
3. Need-for-Water Analysis Results
4. Supplemental Supply Component

Board Workshop #6: February 13, 2008
1. Updates: BOD#5 Action Items, Water Transfers, Final Demand Estimate, Need-for-Water
2. Component Screening & Evaluation, Part 1

Board Workshop #7: March 25, 2008
1. Project Update
2. Component Screening Part 2, with Component Costs
3. Portfolio Building

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EBMUD Water Supply Management Program 2040

Upcoming Workshops

Today: April 7, 2008 CLC Meeting
- Project Update
- Component Screening Part 2, with Component Costs
- Portfolio Building

Board Workshop #8: April 22, 2008
- Portfolio Screening & Evaluation

> May 19, 2008 CLC Meeting to follow (rescheduled from June 2)

Board Workshop #9: June 24, 2008
- Identify Preferred Portfolio & Implementation Strategy

> CLC Members are encouraged to attend

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EBMUD Water Supply Management Program 2040

Evaluation of Climate Change
Approach & Results

8

Water Supply Management Program 2040

Approach

1. Identify factors which may influence EBMUD system performance
   - Customer demand
   - Runoff amount
   - Runoff pattern
2. Vary these 3 factors & Test Current EBMUD System Performance
   - Quantify how much EBMUD system affected by each factor?
   - What are critical vulnerabilities?
3. Test 4 to 6 portfolios to identify system vulnerabilities

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Water Supply Management Program 2040

Evaluation Factors

- Change in demands resulting from 2.2°C rise in temperature by 2040 (10 MGD increase)
- Shift in springtime runoff resulting from 2°C, 3°C, & 4°C increase in temperature
- Reduction in precipitation & Mokelumne River runoff by 10% & 20%
- River water temperature also likely to rise (not included in hydrologic analysis)

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Water Supply Management Program 2040

Current System Performance

Factor/Case Examined	Impact on System Storage	Impacts on Rationing	Impacts on Flood Releases
Increased Customer Demand (3.6%)	5% average decrease in effective system storage	▪ Up to 16 TAF increase in single year of rationing ▪ No change in rationing frequency	None
Shift in Springtime Runoff	Approx. 5% decrease in effective system storage	▪ Up to 21 TAF increase in a single year of rationing ▪ No change in rationing frequency	▪ Small (1 to 6%) increase in total releases ▪ Decrease (12 to 15%) in spring release
Decrease in Precip & Runoff (10 to 20%)	12 to 24% decrease in effective system storage	▪ Up to 60 TAF increase in a single year of rationing ▪ Significant increases in rationing frequency	▪ Large (27 to 52%) decrease in total release ▪ Similar decrease in spring release

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Water Supply Management Program 2040

Vulnerabilities

Under climate change, District's current system is most vulnerable to:

- Extended droughts, making impacts of current Drought Planning Sequence more severe
- Decreases in annual runoff volumes

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Water Supply Management Program 2040

Implications on Portfolios & Strategy

- District will need flexible Portfolio/Strategy to implement projects in future when triggered by documented climate change effects
- Additional storage provides additional capacity should timing of spring runoff shift

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Water Supply Management Program 2040

Drought Rationing Component

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Water Supply Management Program 2040

Program Types

Stage	April Projection of Storage on September 30	Reduction Goal	Voluntary/ Mandatory
	500 TAF or more	None	
Moderate	500-450 TAF	0 to 15%	Voluntary
Severe	450-300	15 to 25%	Mandatory
Critical	Less than 300 TAF	25%	Mandatory

TAF – Thousand Acre-Feet

Note: Projected storage includes supplemental supply

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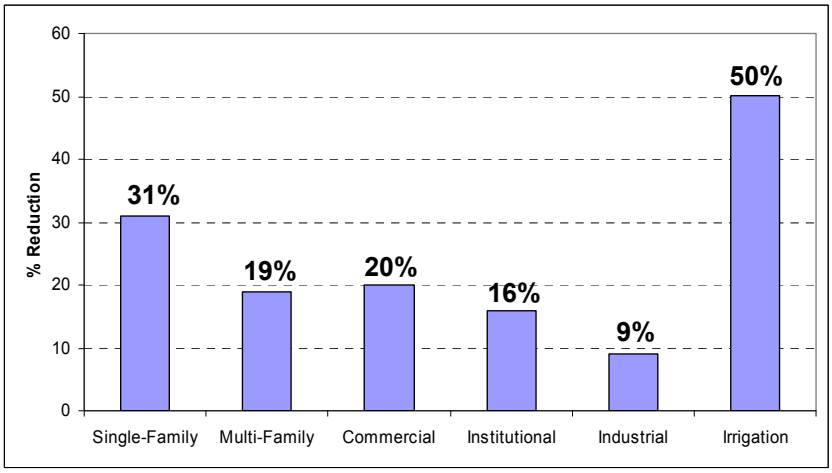
Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 25%



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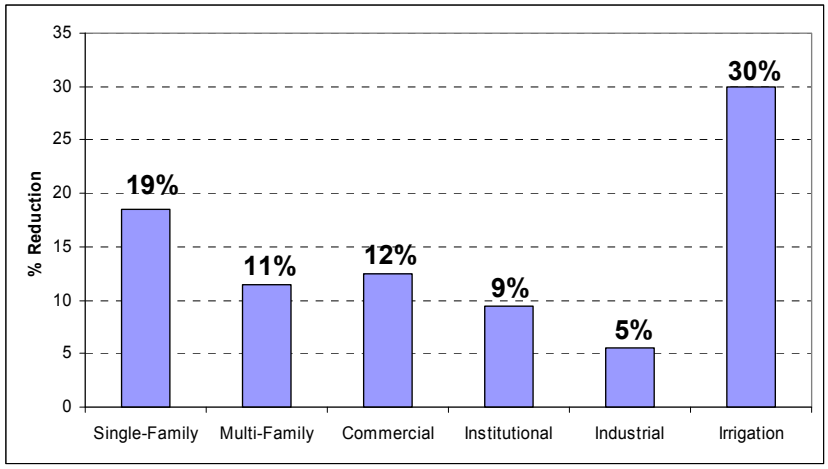
Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 15%



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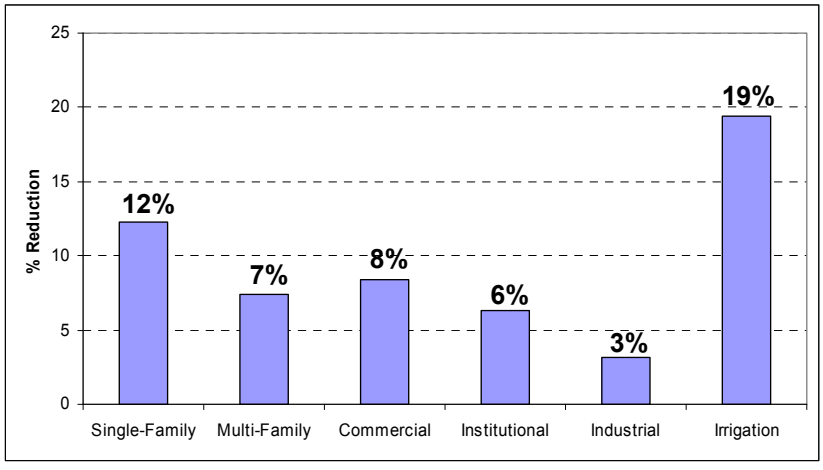
Water Supply Management Program 2040

System-wide Rationing Scenario

Annual Average = 10%



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Water Supply Management Program 2040

Planned Rationing for Other Agencies

Zone 7 Water Agency	0%
Metropolitan Water District of So. Cal.	0%
Marin Municipal Water District	10% / 25%
San Francisco PUC	10 - 20%
Contra Costa Water District	15%
Alameda County Water District	10%
Santa Clara Valley Water District	No Policy

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Source: Urban Water Management Plan (UWMP) 2005 Documents.

Water Supply Management Program 2040

Cost of Water Shortage

Approach & Preliminary Results

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Water Supply Management Program 2040

Objectives

1. Inform evaluation & comparison of system-average rationing levels of 10%, 15%, & 25%
2. Determine customer impacts & costs of each rationing level
3. Provide information on the impact of water shortages to business within the service area
4. Allow comparison of costs of water shortages to other studies & water districts

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Water Supply Management Program 2040

Approach

Cost of water shortage to residential & institutional water users:

- Evaluate the maximum amount that customers would be willing to pay to avoid a water shortage
- Incorporates WSMP 2040 Demand projection
- Used by SFPUC, Alameda County Water District, DWR
- Reviewed & endorsed by CLC member, Dr. Hanemann

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Water Supply Management Program 2040

Approach

Impact of water shortages on commercial & industrial water users:

- Use data developed by SFPUC in early 1990s on relationships between output, payroll, & water use
- Regional economic model referenced to estimate service area impacts
- Approach similar to one used by 2007 SFPUC Drought Impact Study

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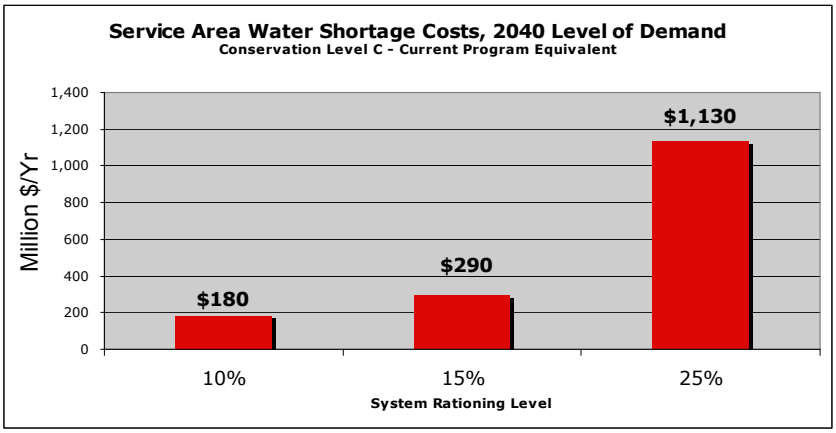
Water Supply Management Program 2040

Results



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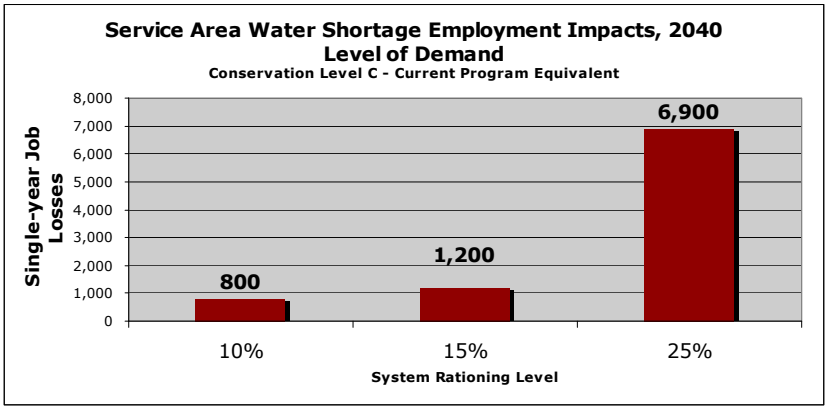
Water Supply Management Program 2040

Results



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Water Supply Management Program 2040

Comparison to Previous Studies

- Residential shortage cost methodology used by
  - RAND, CA Drought Impact Study
  - DWR, Urban Shortage Cost Analysis
  - State of California, Climate Change Impact Studies
  - SFPUC, Regional Drought Impact Study, Catastrophic System Failure Study
- Commercial & Industrial impacts consistent with previous findings
  - CUWA industrial water shortage cost study
  - RAND data on payroll impacts during 1987-91 drought
  - SFPUC, Regional Drought Impact Study

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Water Supply Management Program 2040

Next Steps

- Incorporate Shortage Costs into Portfolio Modeling to generate information on:
  - Total Portfolio Cost Analysis: Water Supply Cost from W-E Model + Shortage Cost
  - Frequency of shortages by portfolio
  - Distribution of shortage costs & impacts by portfolio

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Water Supply Management Program 2040

Component Screening Part 2

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Water Supply Management Program 2040

Supplemental Supply Projects

Dry Year Unit Cost Estimates

Table 2 - Supplemental Supply Projects Preliminary Dry Year Yield Unit Cost Estimates[a]

Project ID	Project Name	Online Yr	Operation	Dry Year Yield (MGD)	EBMUD Capital Cost (Mil. $)	EBMUD O&M ($/MG)[c]	Total Energy Use KWh/MG[d]	EBMUD Unit Cost ($/AF, Dry Yield)[e]
SUP-25	Northern California Permanent Water Transfer[b]	2010	Permanent	4.5-44.6	$20.0-$200.0	$649	5,217	**$630**
SUP-11	Buckhorn Canyon Reservoir	2020	Storage	42.0	$243.9	$451	3,667	**$710**
SUP-24	Enlarged Pardee Reservoir	2020	Storage	51.2	$340.3	$324	2,021	**$730**
SUP-22	Enlarge Lower Bear Reservoir	2015	Storage	2.2	$12.1	$418	3,038	**$840**
SUP-09	Bayside Phase 2 Groundwater Project	2013	Conjunctive Use	9.0	$35.4	$853	4,719	**$890**
SUP-21	Inter-Regional Conjunctive Use Project (IR-CUP)/San Joaquin (SJ) Groundwater Banking[f]	2014	Conjunctive Use	17.4	$121.1	$1,051	7,919	**$1,200**
SUP-18	Regional Desalination Project	2012	Dry Year	20.0	$72.4	$3,912	11,000	**$1,900**
SUP-07	Groundwater Banking/Exchange (Sacramento Basin)[f]	2014	Conjunctive Use	4.2	$50.1	$1,326	8,895	**$1,900**
SUP-16	LEAD at C&H Sugar	2012	Baseload	1.5	$23.4	$1,945	0	**$2,600**

Notes:
a. Final dry-year yield unit costs will be derived from WEAP modeling. These values will be different than those shown here for comparative purposes.
b. Northern California Permanent Water Transfer costs were based on recent transfers occurring in the State of California. Note that past water prices are no guarantee of how prices may change in the future.
c. O&M costs for adjusted for dry year and recharge year operations depending on the project. O&M costs for idle years are assumed to be 10% of operating year O&M costs.
d. Approximate costs of pumping water through Freeport intake and Mokelumne aqueducts are incorporated into this table for comparative purposes. The expected actual costs will be estimated by the WEAP model.
e. Rounded to nearest $10/AF
f. For groundwater banking projects (IR-CUP/SJ Groundwater Banking, Groundwater Banking/Exchange in Sacramento Basin and the Bayside Phase 2 Groundwater Project), it is estimated that approximately 10% of the water will be lost to migration and delivery system losses. These losses are reflected in this table.

Water Supply Management Program 2040

Recycled Water Projects

Dry Year Unit Cost Estimates

Table 3 – Recycled Water Projects Preliminary Dry Year Yield Unit Cost Estimates

Project ID	Project Name	Online Year	Expected Operation	Dry Year Yield (MGD)	EBMUD Capital Cost (Mil. $)	EBMUD Variable O&M (d) ($/MG)	Variable Energy Use (KWh/MG)	EBMUD Dry Year Unit Cost (e) ($/AF)
REC-01A	ConocoPhillips RWP Phase 2 (a)	2015	Baseload	0.90	$2.9	$-	3,751	**$400**
REC-07	RARE Future Expansion (b)	2015	Baseload	1.00	$-	$1,221	5,606	**$1,300**
REC-06	RARE Phase 2	2012	Baseload	0.50	$-	$1,276	5,606	**$1,400**
REC-10	SRVRWP Phase 2	2010	Baseload	0.75	$5.0	$849	4,265	**$1,600**
REC-12	SRVRWP Phase 4	2016	Baseload	0.37	$2.5	$849	4,265	**$1,600**
REC-01	ConocoPhillips RWP Phase 1	2012	Baseload	2.80	$39.8	$-	3,751	**$1,700**
REC-16	Lake Chabot Raw Water Expansion Project	2010	Baseload	0.36	$4.7	$468	1,051	**$1,800**
REC-11	SRVRWP Phase 3	2013	Baseload	0.58	$5.5	$849	4,265	**$1,900**
REC-04	Franklin Canyon Recycled Water Project	2023	Baseload	0.30	$4.0	$712	4,265	**$2,100**
REC-05	North Richmond Water Reclamation Plant Expansion	2018	Baseload	1.70	$15.4	$1,186	5,607	**$2,200**
REC-03	East Bayshore Phase 2 (c)	2014	Baseload	0.60	$9.4	$987	2,679	**$2,600**
REC-13	SRVRWP Phase 5	2018	Baseload	0.30	$5.4	$849	4,265	**$2,700**
REC-14	SRVRWP Phase 6	2020	Baseload	0.20	$4.0	$849	4,265	**$2,900**
REC-02	East Bayshore Phase 1B	2012	Baseload	1.20	$28.0	$987	2,679	**$3,400**
REC-08	Reliez Valley Recycled Water Project	2015	Baseload	0.19	$3.1	$2,807	4,639	**$4,700**
REC-09	San Leandro Water Reclamation Facility Expansion Project: Phase 3	2015	Baseload	0.56	$16.3	$1,474	2,509	**$5,300**
REC-15	Satellite Recycled Water Treatment Plant Projects (Retrofits)	2014	Baseload	0.72	$42.5	$574	1,724	**$6,100**

Notes:
a. Conditional on implementation of COP Phase 1
b. Conditional on implementation of RARE Phase 2.
c. Conditional on implementation of East Bayshore Phase 1B.
d. Gross variable O&M costs. No credit for avoided costs of water delivery in non-dry years.
e. Rounded to nearest $100.

Water Supply Management Program 2040

Conservation
Dry Year Unit Cost Estimates

Table 4 - Conservation Programs Preliminary Dry Year Yield Unit Cost Estimates

Project ID	Project Name	Online Year	Expected Operation	Total Dry Year Yield [a] (MGD)	EBMUD Capital Cost [b] (Mil. $)	EBMUD Variable O&M [c] ($/MG)	EBMUD Average Incremental Dry Year Cost [d] ($/AF)
CON-02	Natural Savings + 10 (B)	Spans planning period	Baseload	29	$31.4	92	**$800**
CON-03	Current Program Equivalent (C)	Spans planning period	Baseload	37	$225.4	432	**$6,200**
CON-04	Current Program Equivalent + 2 (D)	Spans planning period	Baseload	39	$319.4	474	**$13,400**
CON-05	Maximum Voluntary Program (E)	Spans planning period	Baseload	41	$426.0	693	**$19,700**

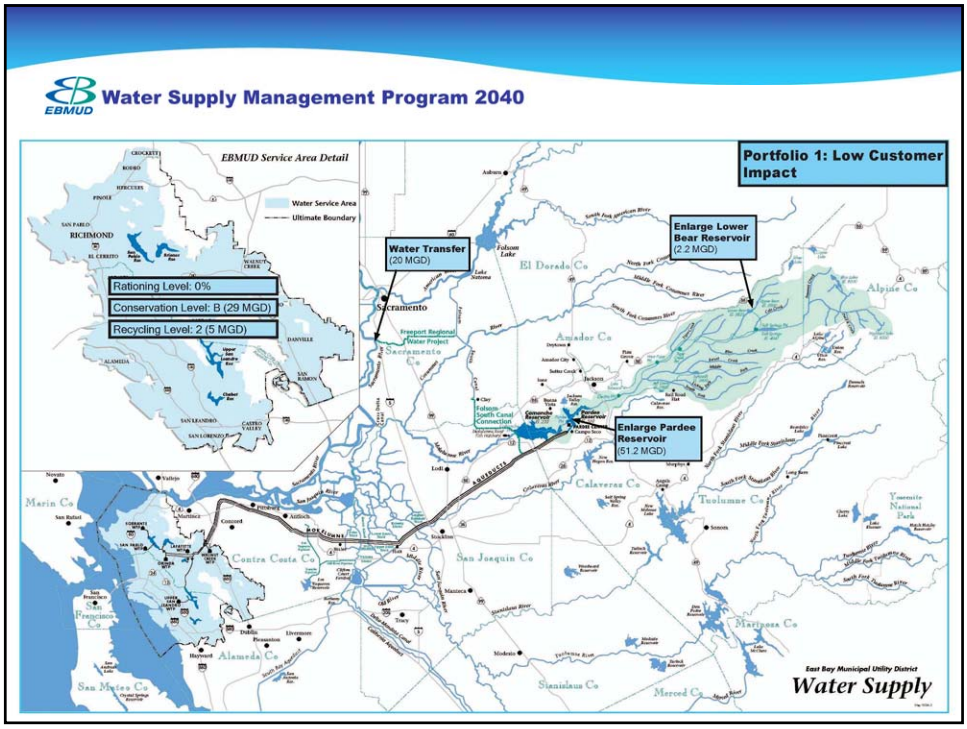
Notes:
a. Total dry-year yield by 2040. Yields ramp up over the planning period. Includes 19.2 MGD yield from plumbing code.
b. 2010 present value capital cost.
c. Gross variable O&M costs. No credit for avoided wastewater treatment costs or avoided costs of water delivery in non-dry years.
d. Rounded to nearest $100.

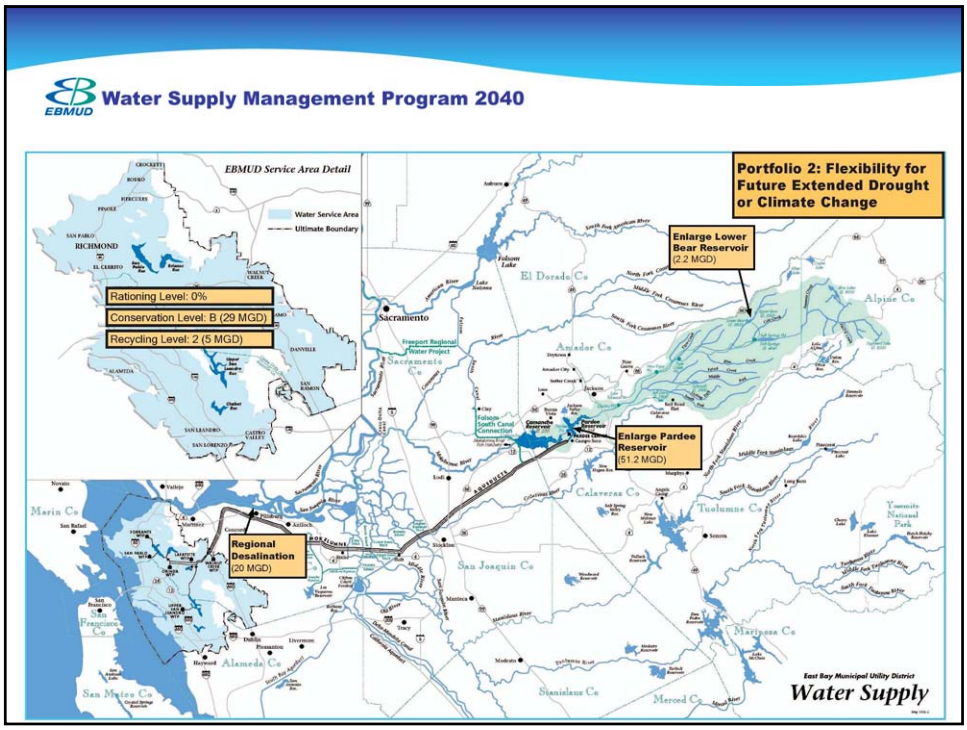
31

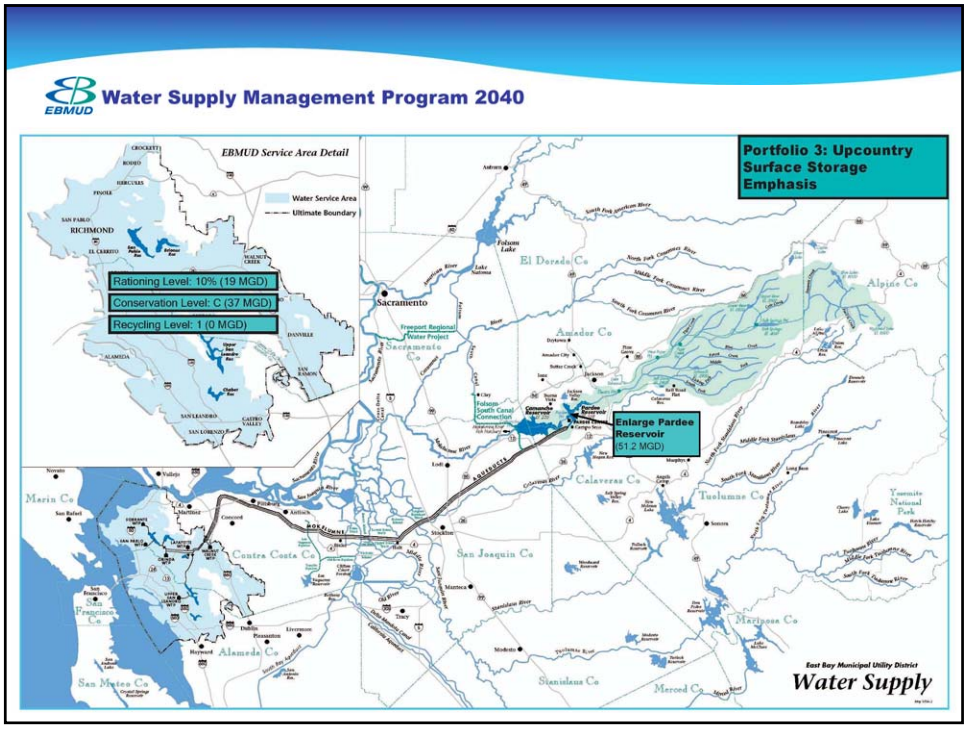
Water Supply Management Program 2040

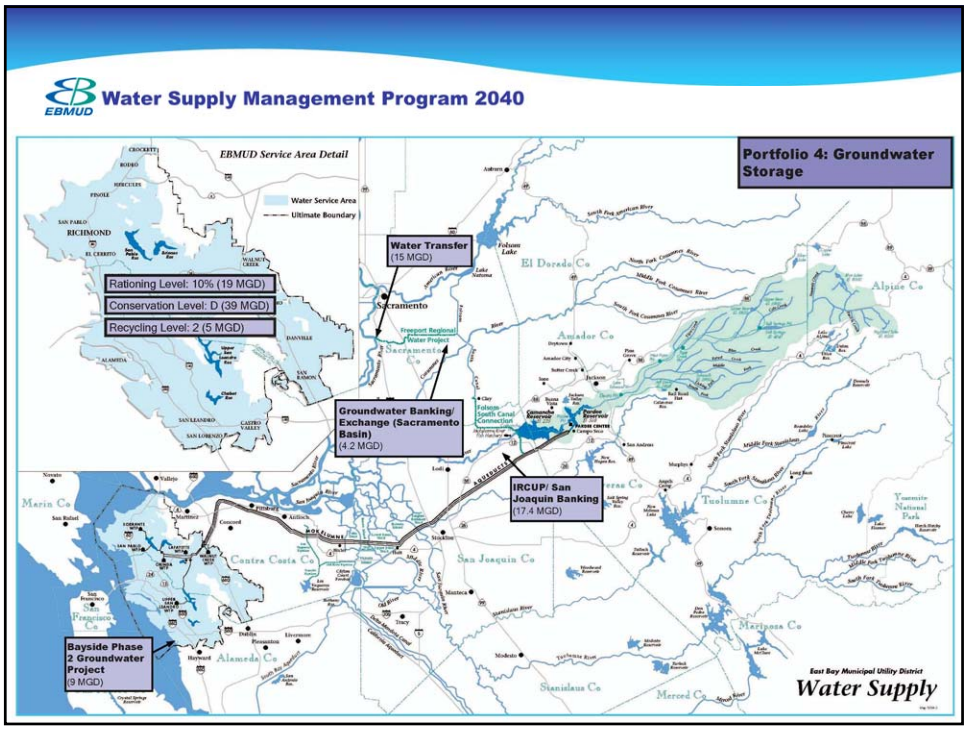
Portfolio Building

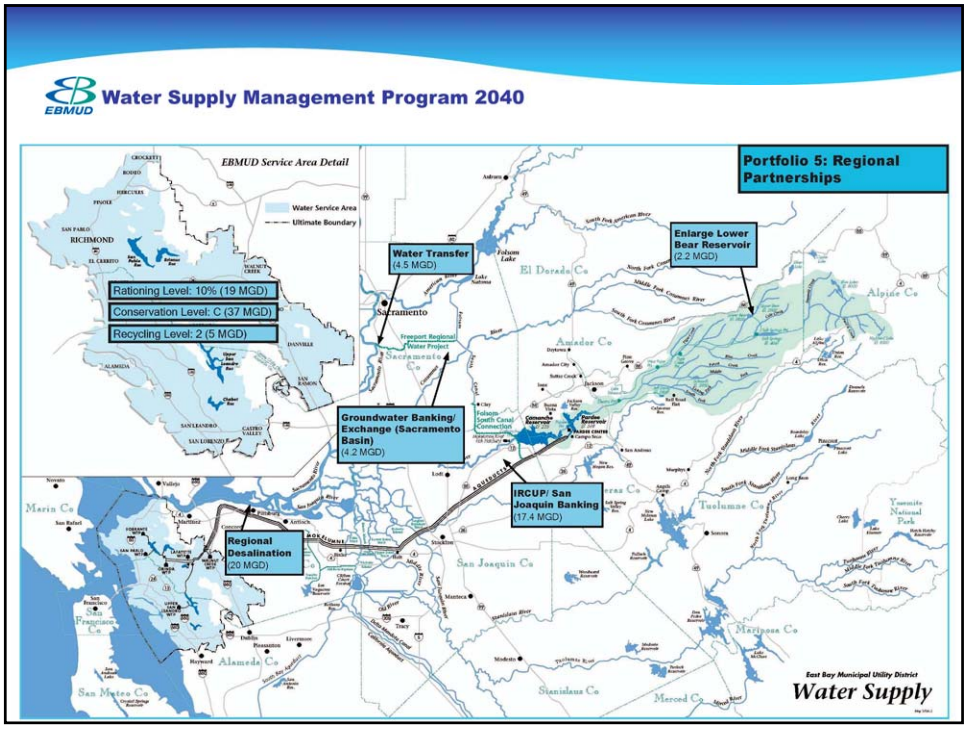
32

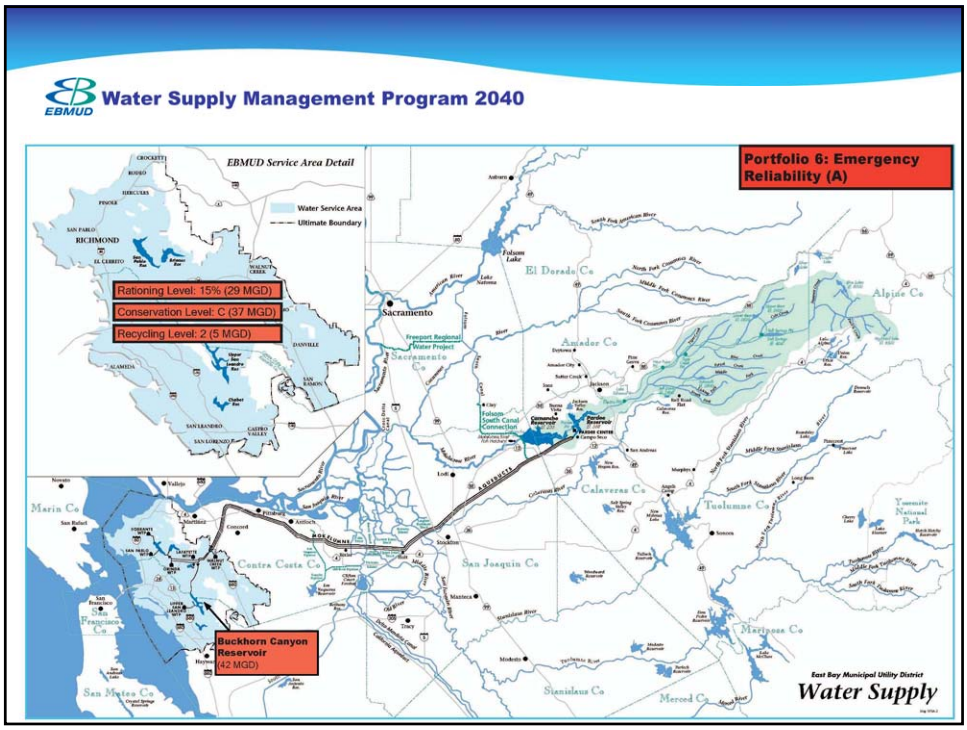

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 1: Low Customer Impact
Water Transfer
(20 MGD)
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 0%
Conservation Level: B (29 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
East Bay Municipal Utility District
Water Supply

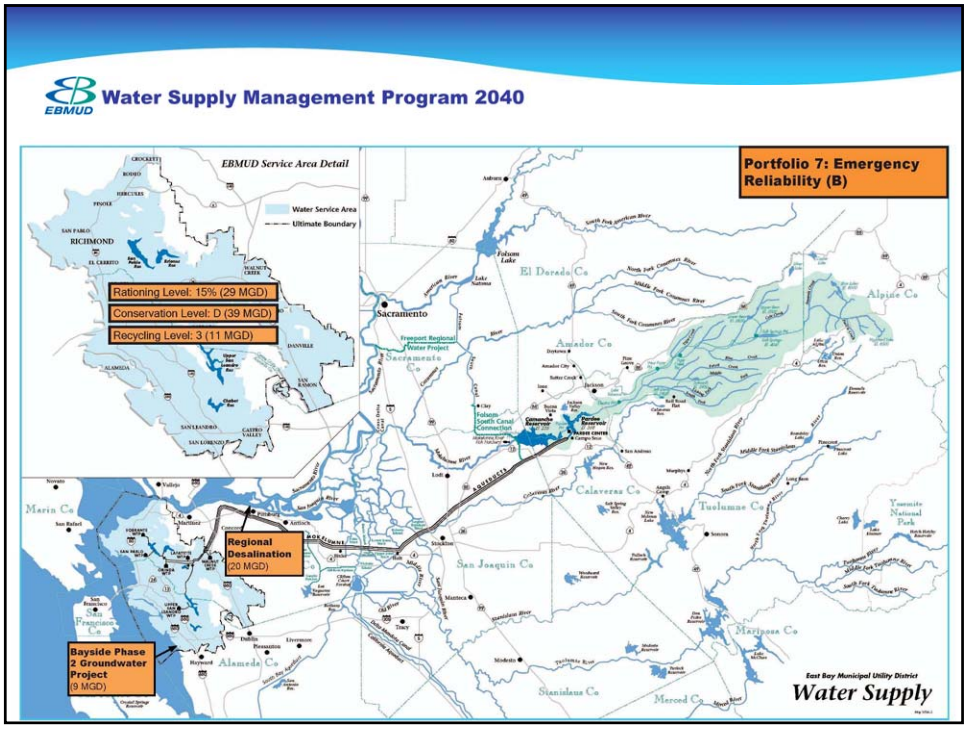

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 2: Flexibility for Future Extended Drought or Climate Change
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 0%
Conservation Level: B (29 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
Regional Desalination
(20 MGD)
East Bay Municipal Utility District
Water Supply

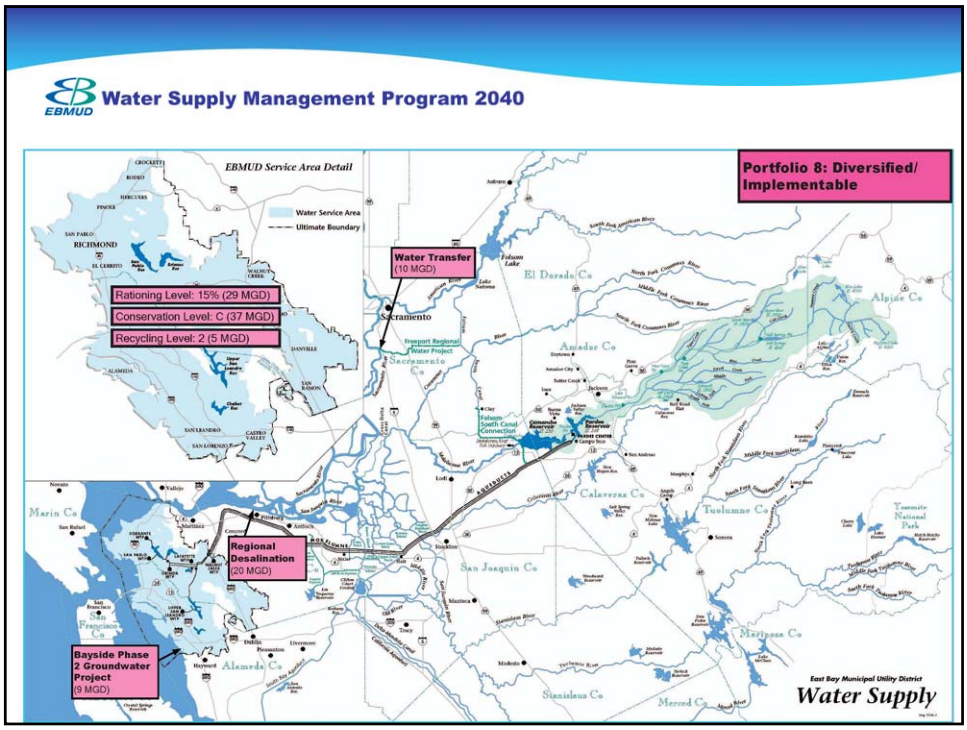

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 3: Upcountry Surface Storage Emphasis
Rationing Level: 10% (19 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 1 (0 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
East Bay Municipal Utility District
Water Supply

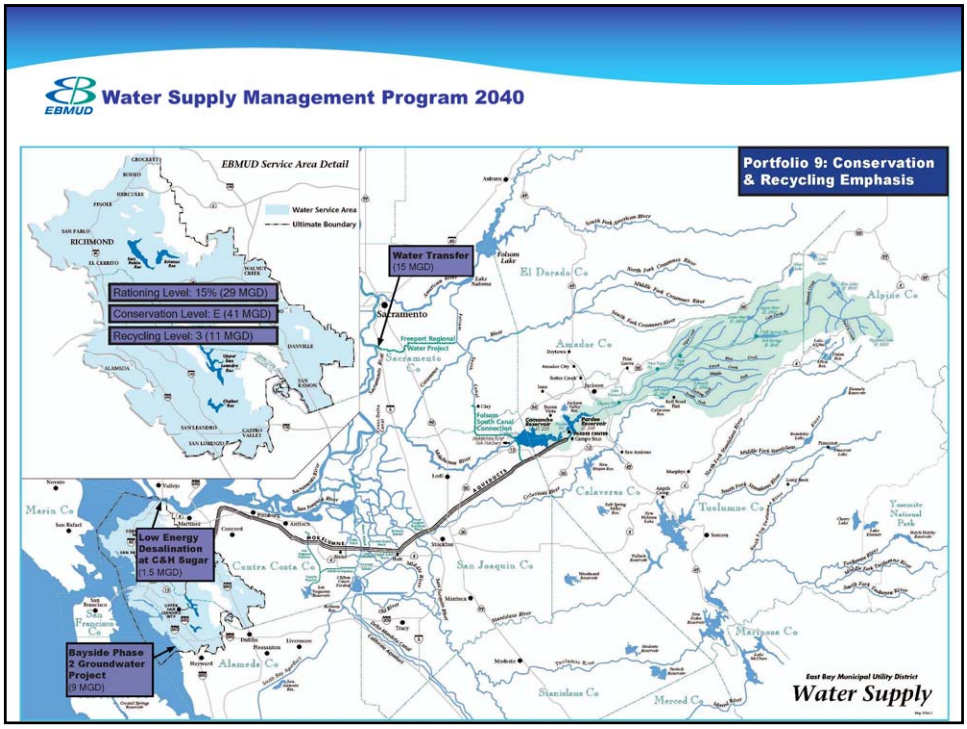

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 4: Groundwater Storage
Rationing Level: 10% (19 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 2 (5 MGD)
Water Transfer
(15 MGD)
Groundwater Banking/ Exchange (Sacramento Basin)
(4.2 MGD)
IRCUP/ San Joaquin Banking
(17.4 MGD)
Bayside Phase 2 Groundwater Project
(9 MGD)
East Bay Municipal Utility District
Water Supply

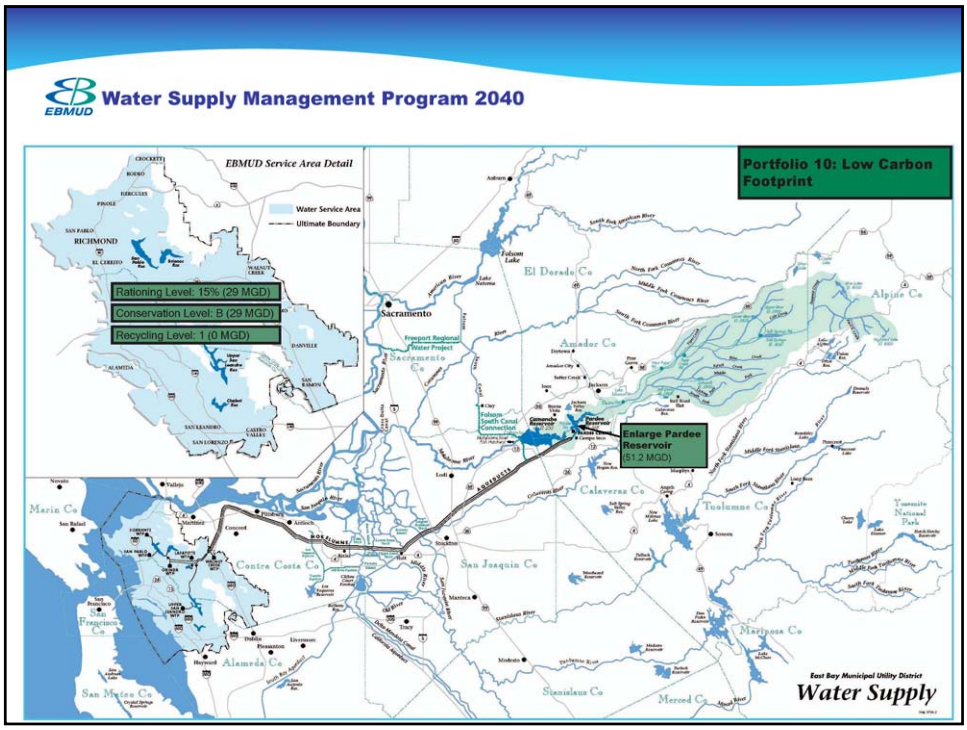

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 5: Regional Partnerships
Water Transfer
(4.5 MGD)
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 10% (19 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Groundwater Banking/ Exchange (Sacramento Basin)
(4.2 MGD)
IRCUP/ San Joaquin Banking
(17.4 MGD)
Regional Desalination
(20 MGD)
East Bay Municipal Utility District
Water Supply

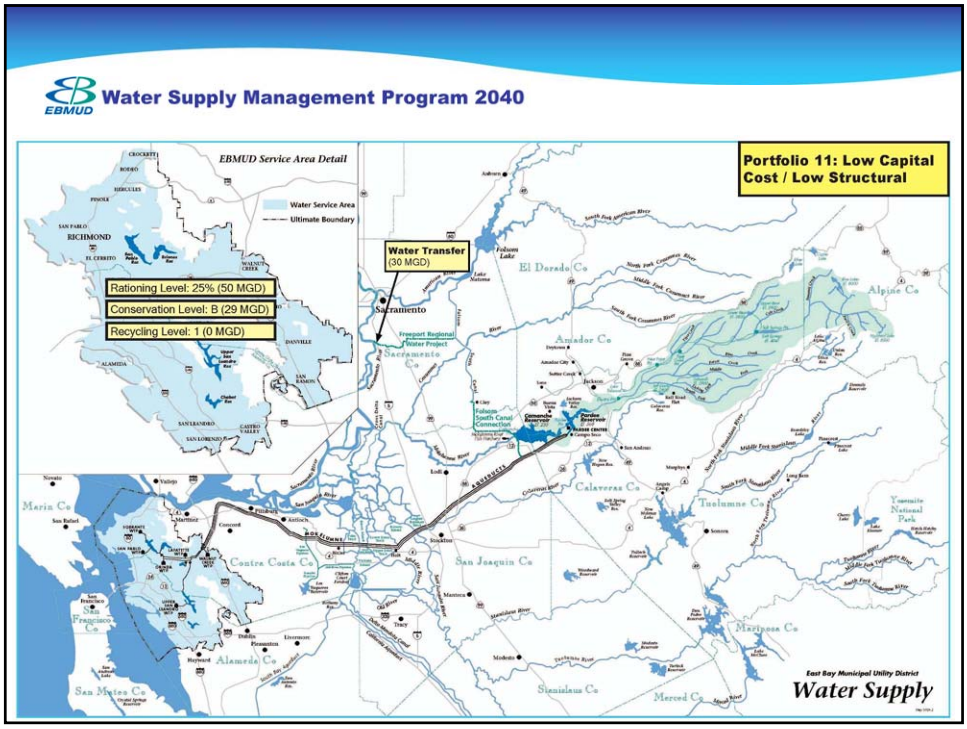

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 6: Emergency Reliability (A)
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Buckhorn Canyon Reservoir
(42 MGD)
East Bay Municipal Utility District
Water Supply

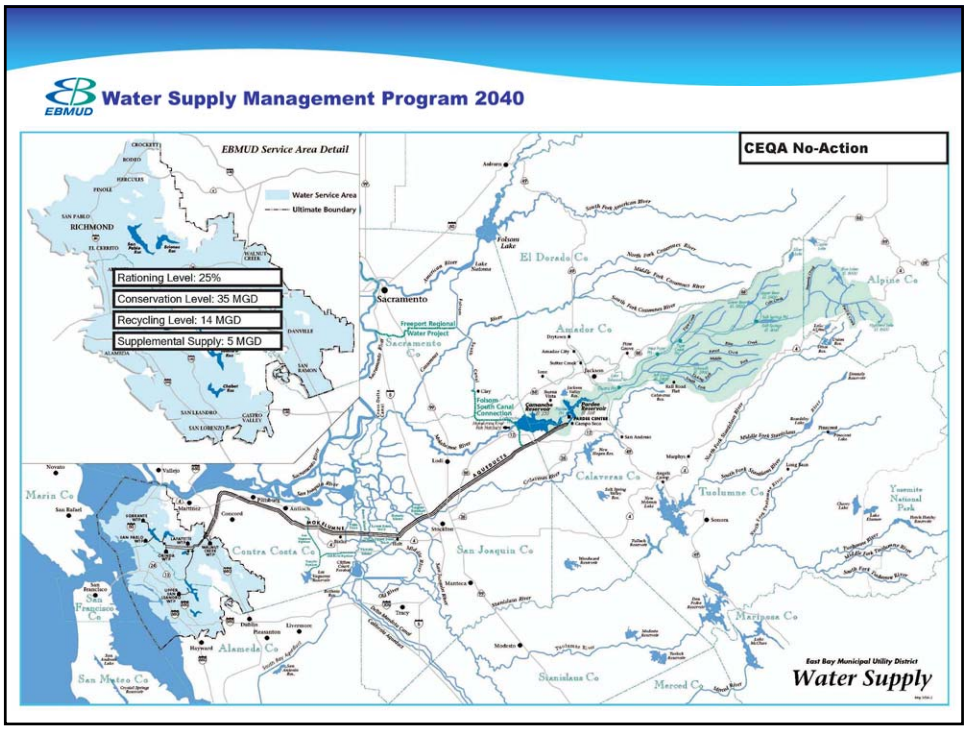

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 7: Emergency Reliability (B)
Rationing Level: 15% (29 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 3 (11 MGD)
Regional Desalination (20 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
Folsom Lake
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Alameda Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 8: Diversified/ Implementable
Water Transfer (10 MGD)
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Regional Desalination (20 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
Folsom Lake
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
Alameda Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio 9: Conservation & Recycling Emphasis
Water Service Area
Ultimate Boundary
Water Transfer (15 MGD)
Rationing Level: 15% (29 MGD)
Conservation Level: E (41 MGD)
Recycling Level: 3 (11 MGD)
Low Energy Desalination at C&H Sugar (1.5 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio 10: Low Carbon Footprint
Water Service Area
Ultimate Boundary
Rationing Level: 15% (29 MGD)
Conservation Level: B (29 MGD)
Recycling Level: 1 (0 MGD)
Enlarge Pardee Reservoir (51.2 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio 11: Low Capital Cost / Low Structural
Water Transfer (30 MGD)
Rationing Level: 25% (50 MGD)
Conservation Level: B (29 MGD)
Recycling Level: 1 (0 MGD)
Sacramento
Freeport Regional Water Project
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
Yosemite National Park
Marin Co
Contra Costa Co
San Joaquin Co
Mariposa Co
Alameda Co
San Mateo Co
Stanislaus Co
Merced Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
CEQA No-Action
Rationing Level: 25%
Conservation Level: 35 MGD
Recycling Level: 14 MGD
Supplemental Supply: 5 MGD
Sacramento
Freeport Regional Water Project
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
Yosemite National Park
Marin Co
Contra Costa Co
San Joaquin Co
Mariposa Co
Alameda Co
San Mateo Co
Stanislaus Co
Merced Co
East Bay Municipal Utility District
Water Supply

EBMUD **Water Supply Management Program 2040**

Portfolio Theme Chart

Portfolio Number	Portfolio Themes	Portfolio Description	Components	Rationing				Conservation				Recycling			Supplemental Supply										
				0%	10% (20 mgd)	15% (29 mgd)	25% (50 mgd)	Natural Savings + 10 (B)	Current Program Equivalent (C)	Current Program Equivalent + 2 (D)	Maximum Voluntary Program (E)[3]	Recycling Level 1	Recycling Level 2	Recycling Level 3	Groundwater Banking/Exchange (Sacramento Basin)[2]	Northern California Water Transfers	Bayside Phase 2 Groundwater Project	Buckhorn Canyon Reservoir	LEAD at C&H Sugar	Regional Desalination	IRCUP/San Joaquin Banking[4]	Enlarge Lower Bear Reservoir	Enlarge Pardee Reservoir	Portfolio Yield (MGD) [Conservation + Recycling + Supplemental Supply]	Average Annual Need for Water (MGD) Under the Chosen Rationing Level
				NFW[1] 107 MGD	NFW[1] 87 MGD	NFW[1] 78 MGD	NFW[1] 57 MGD	29 MGD	37 MGD	39 MGD	41 MGD	0 MGD	5 MGD	11 MGD	4.2 MGD	4.5-44.6 MGD	9 MGD	42 MGD	1.5 MGD	20 MGD	17.4 MGD	2.2 MGD	51.2 MGD		
1	Low Customer Impact	Balance of low rationing, low cost, high water quality.		●				29					5			20						2.2	51.2	107.4	107
2	Flexibility for Future Extended Drought or Climate Change	Keep rationing/conservation & transfers available as short-term response.		●				29					5							20		2.2	51.2	107.4	107
3	Upcountry Surface Storage Emphasis	Portfolio 2 with increased rationing & conservation & no recycling or desal.			●				37			0											51.2	88.2	87
4	Groundwater Storage	Portfolio 3, but replace surface storage with groundwater, & increase conservation, recycling, & transfers.			●					39			5		4.2	15	9				17.4			89.6	87
5	Regional Partnerships	All partnership projects & conservation.			●				37				5		4.2	4.5				20	17.4	2.2		90.3	87
6	Emergency Reliability - A	West of delta surface storage.				●			37				5					42						84.0	77
7	Emergency Reliability - B	West of delta production - desal, recycle, conservation.				●				39				11			9			20				79.0	77
8	Diversified / Implementable	Balanced levels of conservation & recycling, non-Mokelumne sources - transfers, desal, Bayside.				●			37				5			10	9			20				81.0	77
9	Conservation & Recycling Emphasis	High conservation & recycling with LEAD. Transfers & Bayside to satisfy need for water.				●					41			11		15	9		1.5					77.5	77
10	Low Carbon Footprint	Pardee plus conservation.				●			37				5										51.2	93.2	77
11	Low Capital Cost / Low Structural	25% rationing, conservation, & transfers.					●	29				0				30								59.0	57
12	Coleman Alternative 1				●				37					11	4.2	27	9		1.5					89.7	87
13	Katz Alternative 1					●				39				11		8	9							67.0	67
14	Katz Alternative 2						●		37					11			9							57.0	57

Water Supply Management Program 2040

Community Liaison Committee
Meeting #7
May 19, 2008

1

Water Supply Management Program 2040

Agenda

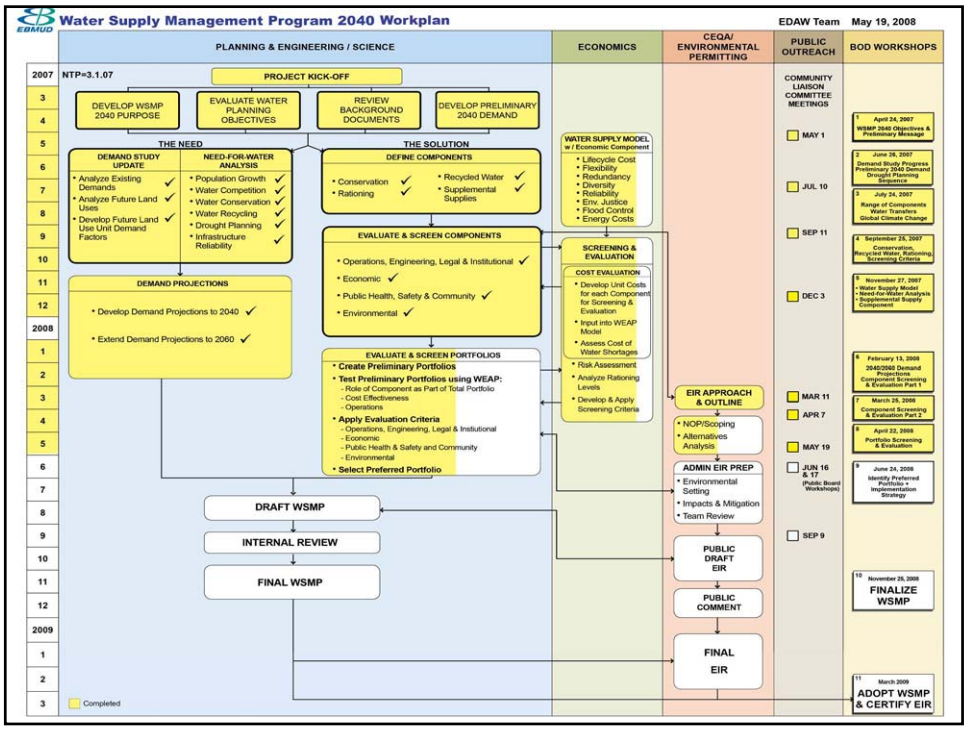
1. Project Update — 15 min
   - Workplan & WSMP 2040 Progress
   - Next Meeting Dates
2. WSMP 2040 Portfolios — 60 min
   - Building WSMP 2040 Portfolios
   - Modeling Results: Key Observations & Findings
   - Portfolio Screening & Evaluation
   - Five Primary Portfolio Alternatives
3. CLC Portfolio Feedback and Comments — 45 min
4. Public Comment — 20 min

2

EBMUD Water Supply Management Program 2040

Project Update

3



Water Supply Management Program 2040

Upcoming Meetings & Workshops

CLC Meeting #7: Today, May 19, 2008
- Portfolio Screening & Evaluation
- CLC Portfolio comments & feedback

Scoping Meetings for the EIR:
- Thursday, May 22, 2008 EBMUD Building (Training Room) in Oakland 6:30-8:30PM
- Thursday, May 29, 2008 Stockton Grand Hotel in Stockton 6:30-8:30PM

Public Board Workshops
- Monday, June 16, 2008 Walnut Creek Presbyterian Church 6:30-8:30PM
- Tuesday, June 17, 2008 EBMUD Building in Oakland 6:30-8:30PM

Board Workshop #9: June 24, 2008
- Identify Preferred Portfolio & Implementation Strategy
- CLC Members are encouraged to attend

Next CLC Meeting?

5

Water Supply Management Program 2040

WSMP 2040 Portfolios
Key Findings & Observations
Preliminary Modeling Results (Round 2)

6

Water Supply Management Program 2040

WSMP 2040 Portfolios - Preliminary Modeling Results (Round 2)

Portfolio Number	Maximum Rationing Percent	Average Annual Volume of Water (MGD) Over 3-Year Drought Planning Sequence					Rationing Frequency (No. of years in a 10-year period)	Cost[1]				Portfolio Number
		Rationing	Conservation	Recycled	Supplemental Supply	Total System		Cost of Water Shortage (Cost to Customer)		Total Portfolio Cost (Cost to District) $M/Yr	Total Capital Costs $M	
								Avg. Annual Cost $M/Yr[2]	Max Annual Cost $M/Yr			
1	0%	0.0	29.3	5.0	61.5	95.9	0.0	0.0	0.0	16.9	450	1
2	0%	0.0	29.3	5.0	61.5	95.9	0.0	0.0	0.0	16.8	440	2
3	10%	13.7	37.3	0.0	47.2	98.1	1.4	15.3	183	17.7	540	3
4	10%	19.5	39.4	5.0	45.6	109.6	1.8	15.2	182	26.9	670	4
5	10%	19.5	37.3	5.0	48.0	109.8	1.8	15.2	183	23.9	570	5
6	15%	29.4	37.3	5.0	42.0	113.7	1.9	28.0	289	15.9	500	6
7	15%	29.6	39.4	11.0	29.0	109.0	1.8	24.0	288	24.3	610	7
8	15%	29.5	37.3	5.0	39.0	110.9	1.8	24.7	289	16.0	440	8
9	15%	29.6	40.9	11.0	25.5	107.1	1.8	24.3	288	29.2	750	9
10	15%	20.5	37.3	5.0	36.1	98.9	1.4	22.2	289	19.3	590	10
11	25%	52.0	29.3	0.0	28.6	109.9	2.0	78.9	1,131	7.2	130	11
12	10%	19.5	37.3	11.0	41.3	109.1	1.8	14.8	182	24.2	610	12
13	20%	41.1	39.4	11.0	17.1	108.6	1.8	41.2	482	22.1	580	13
14	25%	52.0	37.3	11.0	9.0	109.3	2.0	73.1	1,120	17.2	450	14

Notes:

1. All cost results reflect a fixed level of demand at 2040 and the historical hydrologic sequence during the modeling period. These numbers will change when run for varying demand levels using indexed sequential modeling.
2. No rationing was imposed under Portfolios 1 and 2.

Water Supply Management Program 2040

Key Findings & Observations

Conveyance & Treatment Operations

- All portfolios except P-1 & P-2 meet the annual Need-for-Water & satisfy operational constraints.
- P-1 & P-2 do not work because of capacity limitations of the aqueducts & water treatment plants.

Water Supply Management Program 2040

Key Findings & Observations

Conveyance & Treatment Operations

- All portfolios except P-6 require upcountry pretreatment.
- In the 3rd year of a drought, sources other than Mokelumne water are required. Not all of these sources can be treated at existing water treatment plants. Therefore, pretreatment is needed before entering the EBMUD aqueduct system.

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Water Supply Management Program 2040

Key Findings & Observations

Regional Desalination

- Regional Desalination component assumes location in Pittsburg.
- Desalinated water from Pittsburg would be treated a second time at EBMUD treatment plants due to transmission system configuration.
- Water cannot be delivered from Pittsburg to partners during peak summer months.
- Partners would need to fund high-cost transmission/ distribution improvements to obtain peak summer deliveries.

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Water Supply Management Program 2040

Key Findings & Observations
P-11 & P-14 & Rationing

- P-11 & P-14 have the highest level of rationing at 25%.
- Rationing is triggered more often in these portfolios than others.
- The cost of water shortage for these portfolios is the highest.

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Water Supply Management Program 2040

WSMP 2040 Portfolios
Portfolio Screening & Evaluation

12

Water Supply Management Program 2040

WSMP 2040 Portfolios – Criteria Evaluation

Portfolio Number	Portfolio Theme	Operations, Engineering, Legal & Institutional				Economic		Public Health, Safety & Community		Environmental		Portfolio Number	Rationale/Notes
		• Minimize the vulnerability & risk of disruptions (i.e. **reliability**).	• Maximize the system's **operational flexibility**.	• Minimize **institutional & legal complexities** & barriers.	• Maximize **partnerships** & regional solutions.	• Minimize the financial **cost** to the District of meeting customer demands for given level of system reliability.	• Minimize **customer** water shortage **costs**.	• Minimize potential adverse impacts to the **public health** of District customers. • Maximize use of water from the **best** available **source**.	• Minimize long-term adverse **community impacts**. • Minimize adverse **social effects**. • Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	• Minimize adverse **impacts** on the **environment**. • Minimize construction & operation effects on environmentally **sensitive resources**.	• Minimize short term & long term **greenhouse gas emissions** from construction. • Maximize **energy efficiency** associated with operations & maintenance. • Maximize contributions to **AB 32 goals**.		
1	Low Customer Impact	Failed Modeling Analysis										1	X
2	Flexibility for Future Extended Drought or Climate Change	Failed Modeling Analysis										2	X
3	Upcountry Surface Storage Emphasis		H				H	H+				3	*Combine with P-10*
4	Groundwater Storage		H	L	H	L	H			H		4	*Includes both Sac & SJ Groundwater Banking/Exchange* ➡
5	Regional Partnerships	H		L	H	L	H	L			L	5	*Most robust number of Components, including Desal* ➡
6	Emergency Reliability - A	H+	H+						L	L		6	*Buckhorn storage - Highest Ops & Engineering scores* ➡
7	Emergency Reliability - B	H		L				L			L	7	*Heavy reliance on Desalination ?*
8	Diversified	H		L				L			L	8	*Reliance on Desalination ?*
9	Conservation & Recycling Emphasis		H		L	L						9	*Conservation Level E - Cost Effectiveness?*
10	Low Carbon Footprint		H					H+				10	*P-3 with Rationing at 15% & Recycling Level 2* ➡
11	Low Capital Cost / Low Structural		L			H	L			H		11	*Cost to customer of 25% Rationing is Prohibitive* X
12	Coleman Alternative 1	L	H	L	H		H			H		12	*Heavy reliance on a Water Transfer of 27 MGD in dry years* ➡
13	Katz Alternative 1		L		L					H		13	*20% Rationing can be tested in Portfolios 4 & 12* ⇨
14	Katz Alternative 2	H	L		L	H	L			H		14	*Cost to customer of 25% Rationing is Prohibitive* X

H=High Response to Evaluation Criteria; L=Low Response to Evaluation Criteria; X=Will Not Further Consider; ➡=Carry Forward as Primary Portfolio for Further Refinement & Testing

Water Supply Management Program 2040

WSMP 2040 Portfolios – Key Decisions

- Rationing: investigate 10%, 15%, and 2 portfolios at 20% (Portfolios #4 & #12)
- Keep portfolio #6 (Buckhorn) to enable review of balanced set of portfolios
- Continue investigation of portfolios # 4,5,6,10 and 12
- Test portfolio #12 with desalination at 20 TAF instead of a water transfer.

Water Supply Management Program 2040

Alternative Portfolios

- Alternative Portfolio A (#4): Groundwater
- Alternative Portfolio B (#5): Diversified
- Alternative Portfolio C (#6): Reliability
- Alternative Portfolio D (#10): Lower Carbon Footprint
- Alternative Portfolio E (#12): Recycling & Transfers

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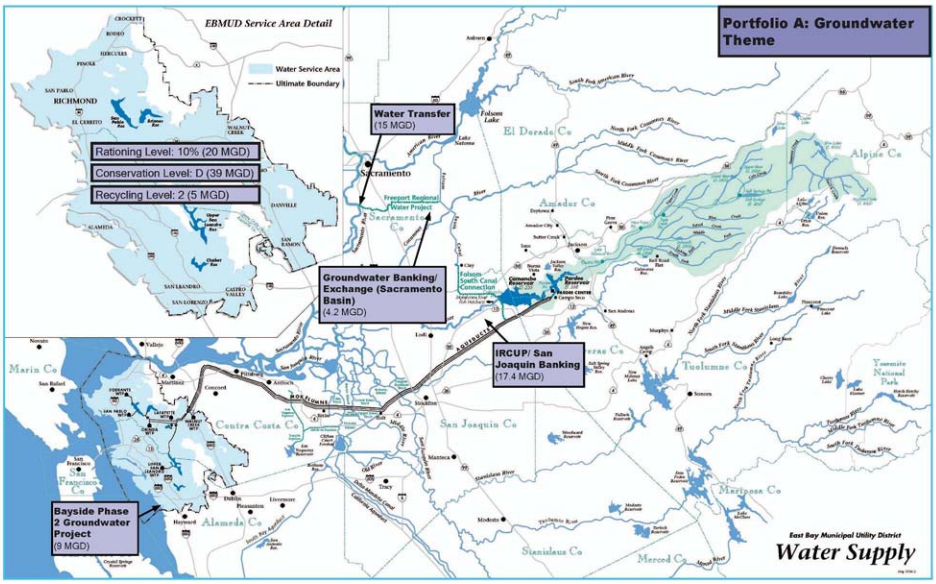
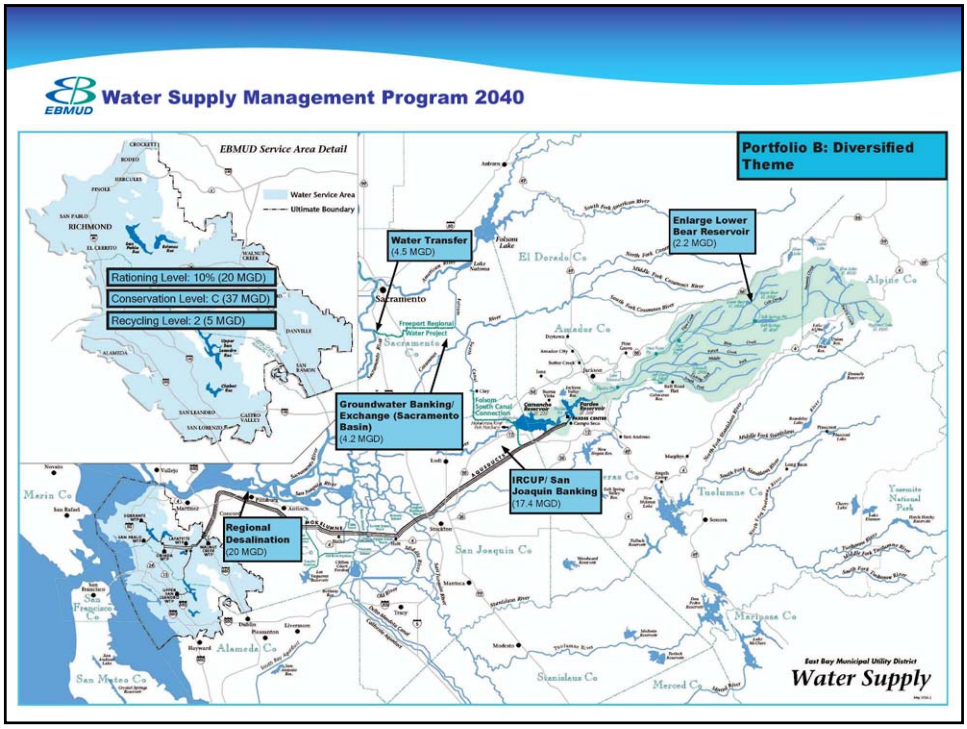
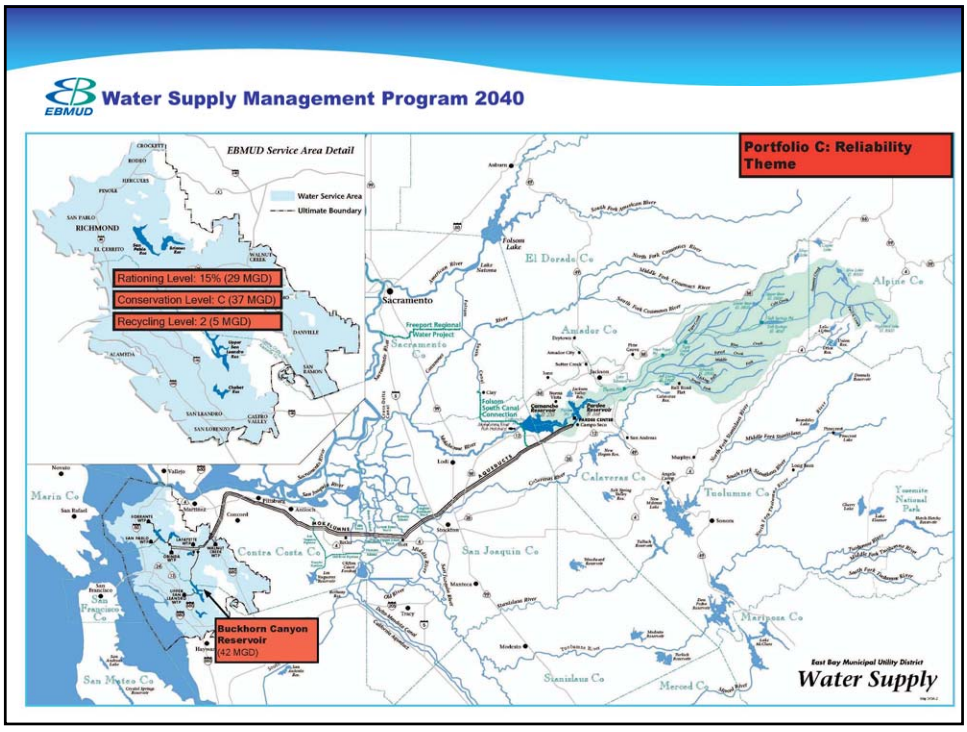
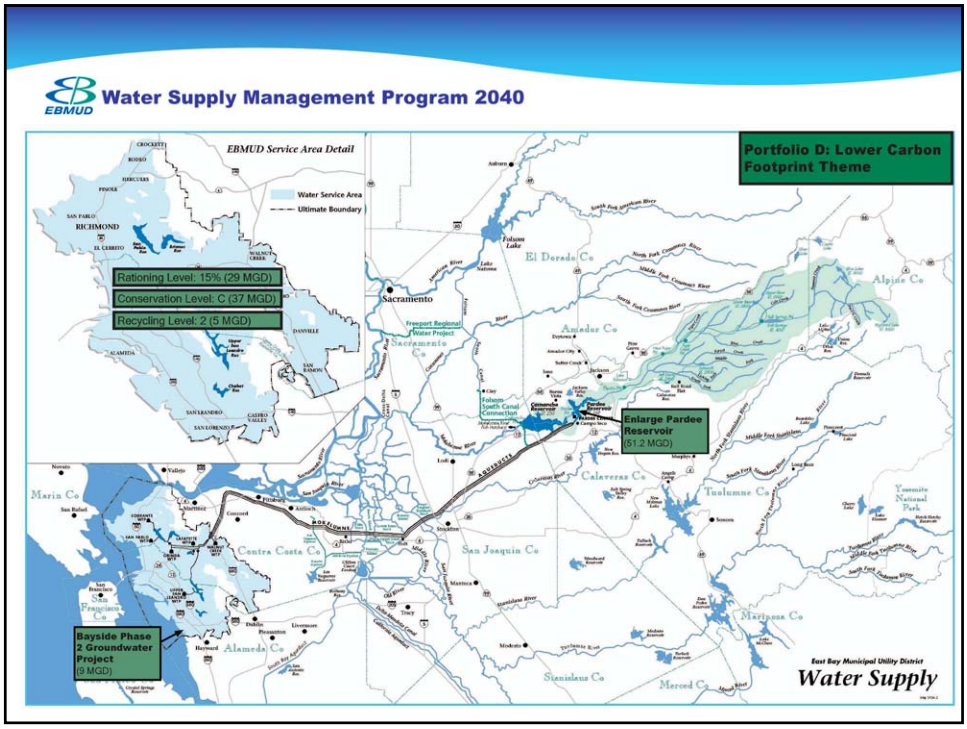
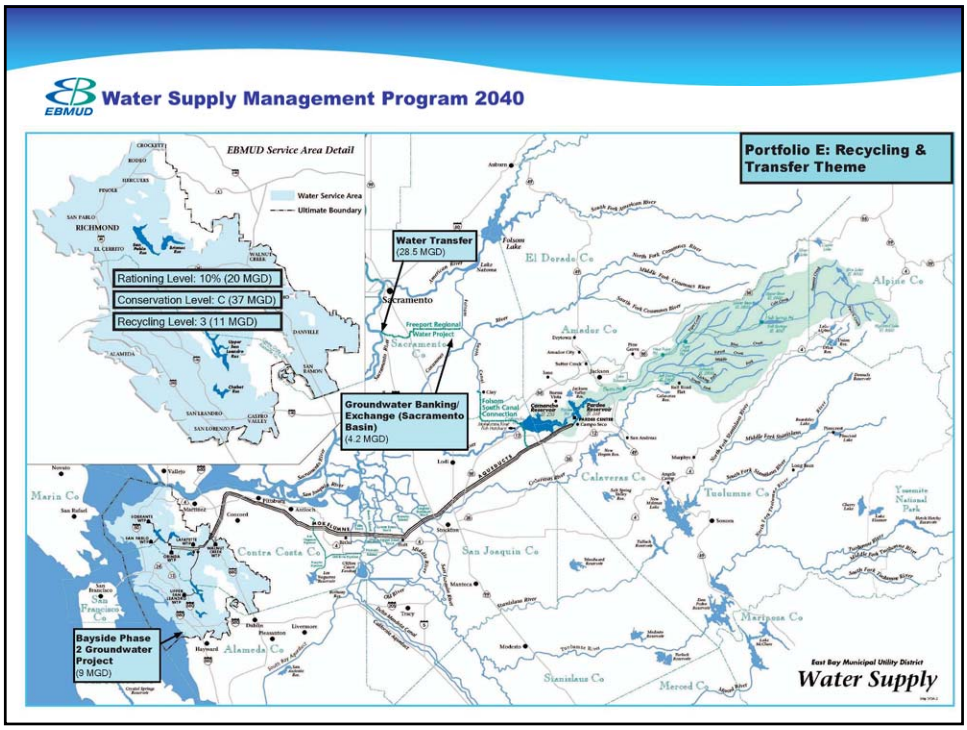
Water Supply Management Program 2040




Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio B: Diversified Theme
Water Service Area
Ultimate Boundary
Water Transfer
(4.5 MGD)
Enlarge Lower Bear Reservoir
(2.2 MGD)
Rationing Level: 10% (20 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Sacramento
Groundwater Banking/ Exchange (Sacramento Basin)
(4.2 MGD)
IRCUP/ San Joaquin Banking
(17.4 MGD)
Regional Desalination
(20 MGD)
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio C: Reliability Theme
Water Service Area
Ultimate Boundary
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Sacramento
Buckhorn Canyon Reservoir
(42 MGD)
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio D: Lower Carbon Footprint Theme
Water Service Area
Ultimate Boundary
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
Bayside Phase 2 Groundwater Project
(9 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio E: Recycling & Transfer Theme
Water Service Area
Ultimate Boundary
Water Transfer
(28.5 MGD)
Rationing Level: 10% (20 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 3 (11 MGD)
Groundwater Banking/ Exchange (Sacramento Basin)
(4.2 MGD)
Bayside Phase 2 Groundwater Project
(9 MGD)
Sacramento
East Bay Municipal Utility District
Water Supply

Water Supply Management Program 2040

CLC Portfolio Feedback

Water Supply Management Program 2040 — CLC PORTFOLIO SCORECARD

Name: | Date:

	ALTERNATIVE PORTFOLIO THEMES	ALTERNATIVE PORTFOLIO EMPHASIS	TOP 3 [Please rank your Top 3 Portfolios with "1", "2" and "3" below].	RATIONALE Please provide your rationale below. Why are these your preferred portfolios? Thank you.
A	Groundwater	Groundwater storage / exchange & transfers		
B	Diversified	Partnership projects including groundwater, desalination & transfers		
C	Reliability	West of delta surface storage		
D	Lower Carbon Footprint	Upcountry surface storage		
E	Recycling & Transfer	High recycling level & major transfer		

Please hand scorecard back in at the meeting or return by May 28, 2008 to yanna.mclaughlin@edaw.com. Thank you.

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Appendix E3

WSMP 2040 Meeting Presentations

Public Workshops

EBMUD Water Supply Management Program 2040

Water Supply Management Program 2040

East Bay Municipal Utility District

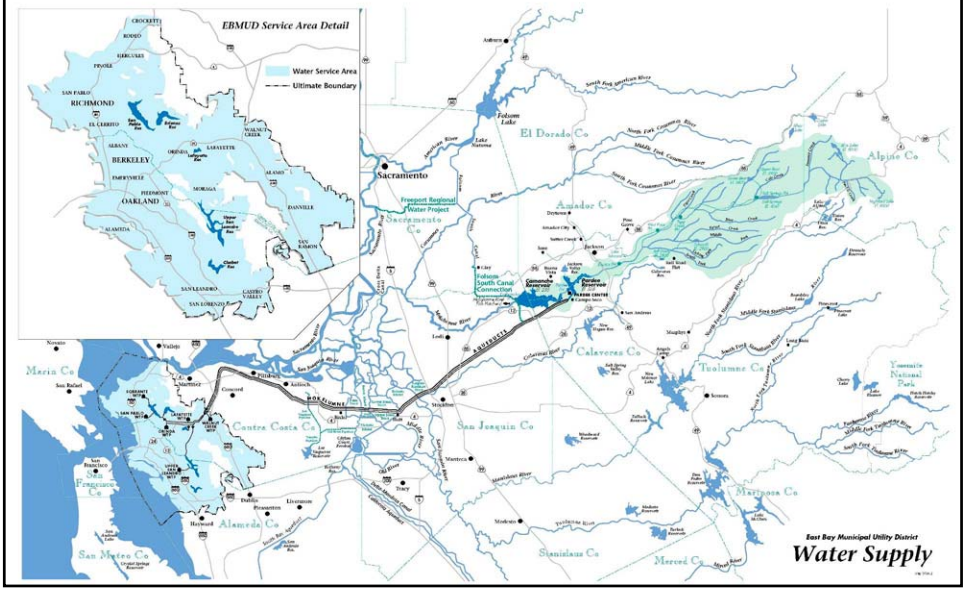
Public Workshop

June 16, 2008 (Walnut Creek)

June 17, 2008 (Oakland)

1

EBMUD Water Supply Management Program 2040




Pardee Reservoir


3 Mokelumne Aqueducts
Across Delta


Freeport Water Intake Facility
(Under Construction)

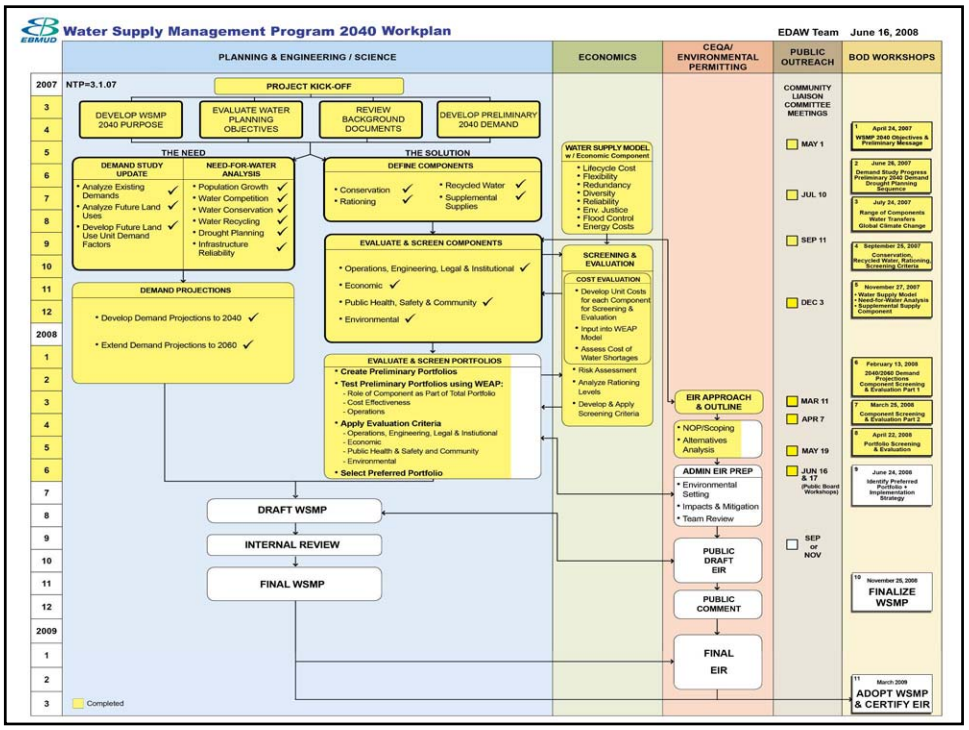

San Pablo Reservoir
Lafayette Reservoir

Water Supply Management Program 2040

WSMP 2040 Purpose

1. Account for accomplishments & changes since 1993 WSMP, including:
   - Freeport;
   - Conservation and Recycling;
   - Seismic Improvement Program;
   - Lower Mokelumne Joint Settlement Agreement;
   - Regional Interties & Forums;
   - New Regulations; and
   - Global Climate Change.
2. Find optimum balance between rationing, conservation, recycling & supplemental supply.
3. Meet growing need for water.
4. Address increased competition for water.

7



Water Supply Management Program 2040

Public Outreach

- Regular Meetings with the Community Liaison Committee
- Meetings with Regional Forums
- Website Updates
- Bill Insert Article
- Public Participation in EIR Process

Water Supply Management Program 2040

Public Outreach

WSMP 2040 Community Liaison Committee

First Name	Last Name	Organization
Barbara	Becnel	Neighborhood House of North Richmond
Charles	Brydon	W.A.T.E.R
Merlin	Edwards	Oakland African American Chamber of Commerce (OAACC)
Stuart	Flashman	Rockridge Community Planning Council - Private Attorney
Henry	Gardner	Association of Bay Area Governments
Charles	Gilcrest	Senior Advisor to Mayor Santos of San Leandro
Walt	Gill	Chevron Richmond Refinery
John	Gioia	Contra Costa County Board of Supervisors
Bob	Glover	Home Builders Association of N. CA.
Betty	Graham	Dept of Health Services, SF District
Michael	Hanneman	UC Berkeley, Water and Economics
Laura	Harnish	Environmental Defense
Kris	Hunt	Contra Costa Taxpayers' Association
Bruce	Kern	East Bay Economic Development Alliance
Howard	Kerr	Oro Loma Sanitary District
Julia	Liou	Asian Health Services
Eleanor	Loynd	May Valley Neighborhood Council, Richmond
David	Nesmith	CA Environmental Water Caucus
Tomi	Van de Brooke	Contra Costa County Board of Supervisors

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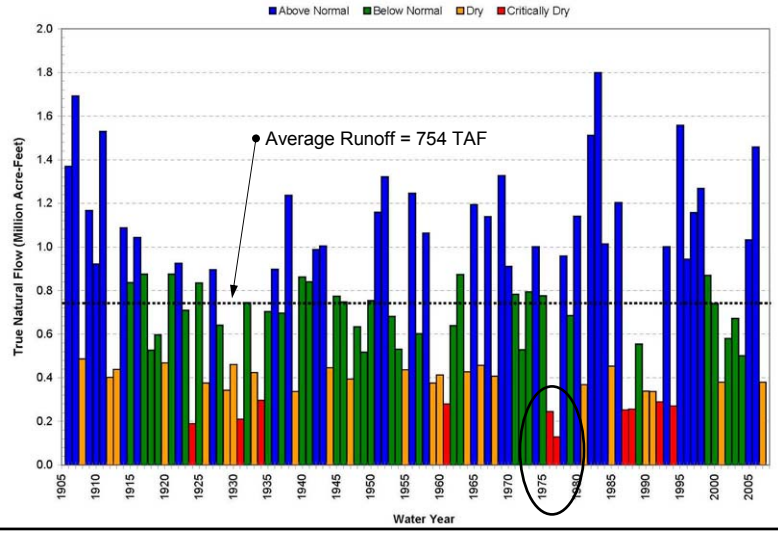
Water Supply Management Program 2040

Demand Study & Need for Water

11

Water Supply Management Program 2040

Mokelumne River Runoff (1906-2007)

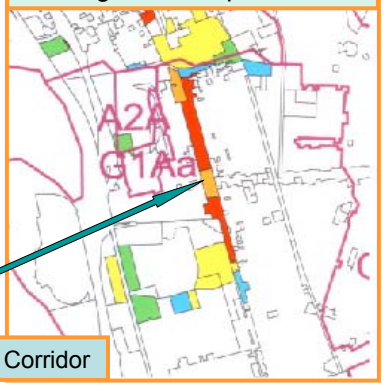


12

Water Supply Management Program 2040

Update & Extend Land Use to 2040

- Infill potential for vacant parcels
- Densification
- Timing of development



San Pablo Ave. Corridor

Water Supply Management Program 2040

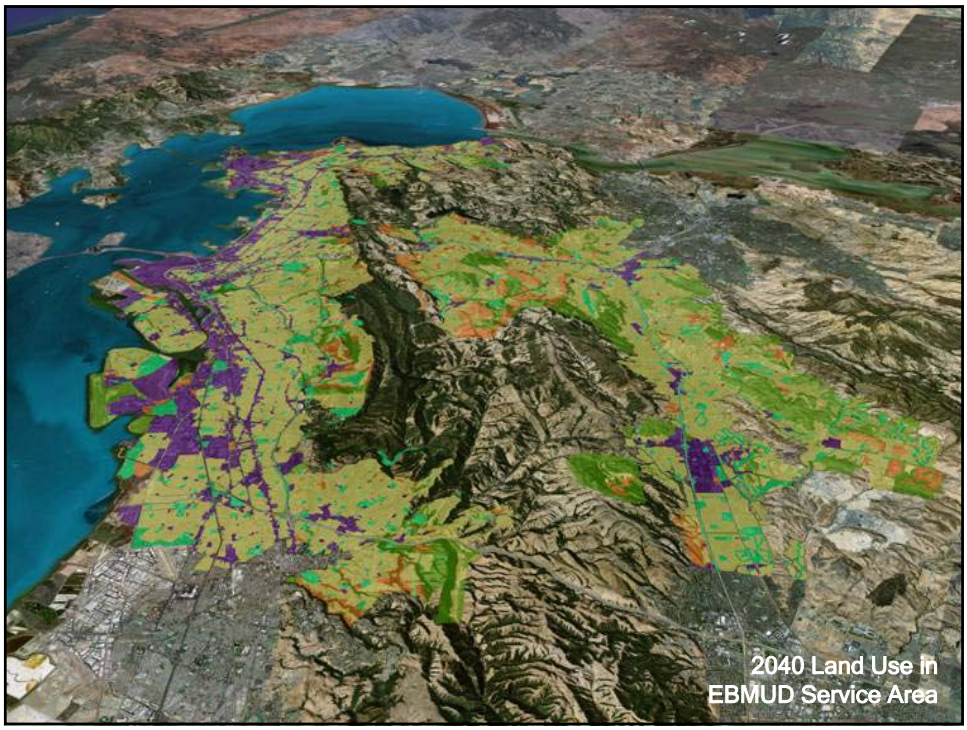
Trend: Increasing Densities

14

Water Supply Management Program 2040

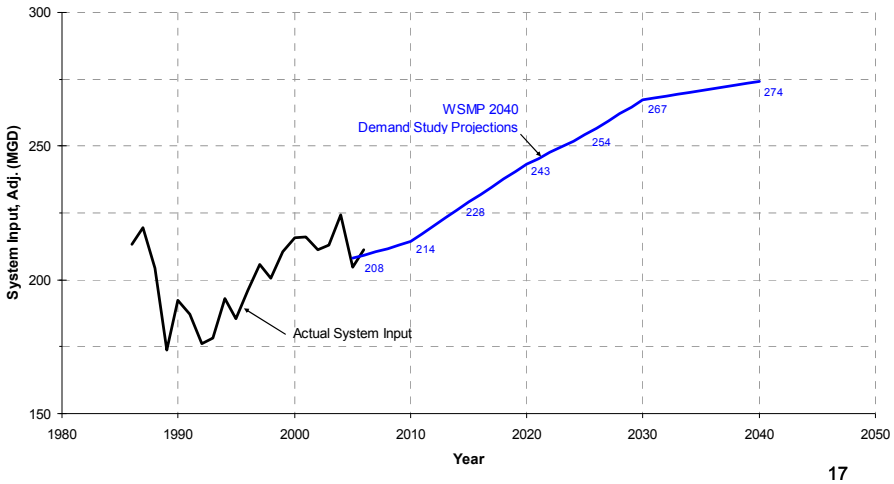
Trend: Redevelopment & Infill

15



Water Supply Management Program 2040

2040 Demand



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Water Supply Management Program 2040

Need for Water in 2040 During Drought Planning Sequence

Maximum rationing	Gross Annual Average Customer Demand (MGD)	Average Annual Need for Water (MGD)	Need for Water over 3 years (TAF)
25%	306[a]	57	194
15%	306	77	259
10%	306	87	294
0%	306	107	359

a. *Includes 274 MGD + 31 MGD for ongoing recycling and conservation*

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Water Supply Management Program 2040

Evaluation of Components

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Water Supply Management Program 2040

WSMP 2040 Planning Objectives

Operations, Engineering, Legal & Institutional
- Provide water supply reliability.
- Utilize current water right entitlements.
- Promote District involvement in regional solutions.

Economic
- Minimize cost to District customers.
- Minimize drought impact to District customers.
- Maximize positive impact to local economy.

Public Health, Safety & Community
- Ensure the high quality of the District's water supply.
- Minimize adverse sociocultural impacts (including environmental justice).
- Minimize risks to public health & safety.
- Maximize security of infrastructure & water supply.

Environmental
- Preserve & protect the environment for future generations.
- Preserve & protect biological resources.
- Minimize carbon footprint.
- Promote recreational opportunities.

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Water Supply Management Program 2040

Range of Components

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Water Supply Management Program 2040

Component Categories

1. Rationing
2. Conservation
3. Recycled & Raw Water
4. Supplemental Supply

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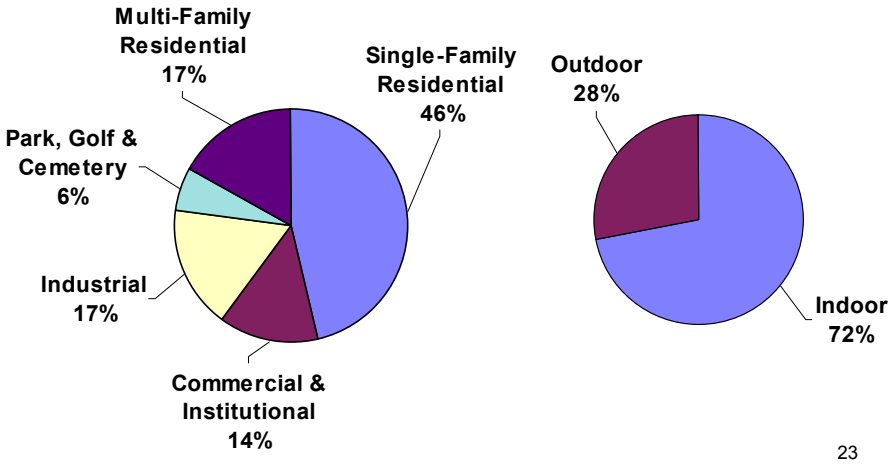
Water Supply Management Program 2040

Water Use Characteristics



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Water Supply Management Program 2040

25% Maximum Rationing Criteria

- 1977: 39% rationing achieved
- 1993: 25% goal incorporated into Water Supply Management Plan (WSMP 2020)
- Present: Board Policy 9.03
  - Maximum water supply deficiency is 25%

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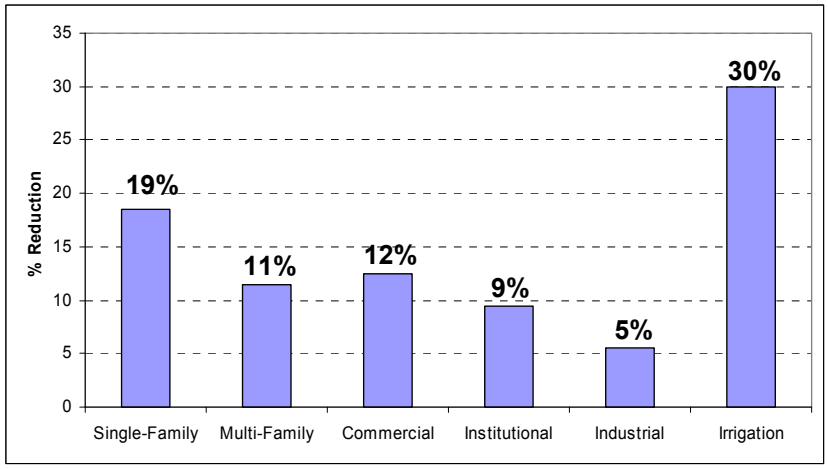
Water Supply Management Program 2040

Rationing Scenario

Annual Average = 15%



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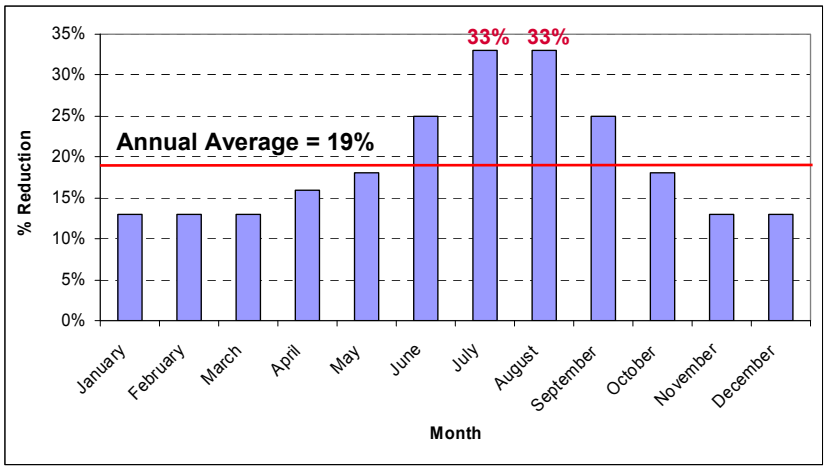
Water Supply Management Program 2040

Single-Family Residential

Annual Average = 15%



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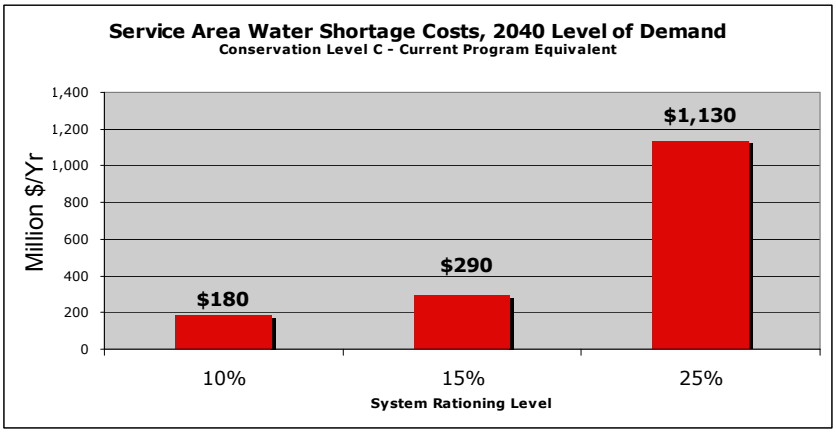
Water Supply Management Program 2040

Shortage Costs



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Water Supply Management Program 2040

Component Categories

1. Rationing
2. Conservation
3. Recycled & Raw Water
4. Supplemental Supply

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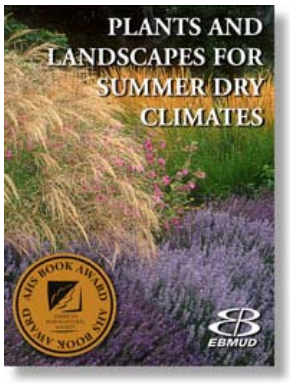
Water Supply Management Program 2040

Conservation Program
1995 – 2008

1. Considered completed for WSMP 2040 planning
2. Water savings estimates:
   - 19.5 MGD through 2006
   - 1.5 MGD/yr for 2007 & 2008
   - 22.5 MGD total (District + natural savings)
3. Programs:
   - Residential and non-residential water surveys and incentives (plumbing fixtures, appliances, irrigation, etc)
   - Natural Conservation (codes & regulatory)
   - Education & Outreach



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Water Supply Management Program 2040

Examples of Water Saving Devices

Irrigation Controller

Water Supply Management Program 2040

Conservation Approach
2009 & beyond

- Analyzed 53 individual conservation measures beyond plumbing codes
- Range of analysis: from natural savings to maximum voluntary conservation potential
- Assess technology, behavior and leak repair
- Assess implementation barriers (e.g. customer acceptance, market saturation, cost)
- Range of market saturation by measure: <1% to 95%

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Water Supply Management Program 2040

Examples of Indoor Conservation Measures

- Residential water surveys
- Commercial & industrial surveys
- Clothes washer rebates
- Toilet rebates
- Showerheads, aerators
- Pre-rinse spray valves
- Dishwasher rebates
- Plumbing codes
- Commercial washer rebates
- Air-cooled ice machines
- Food steamers
- Hot water on-demand systems
- Commercial equipment upgrades
- Industrial process upgrades
- Digital x-ray technology

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Water Supply Management Program 2040

Examples of Outdoor Conservation Measures

- Landscape water surveys
- Landscape water budgets
- Landscape ordinances
- Advanced metering systems
- Submetering
- Weather-based controllers
- Leak detection/customer notification
- Irrigation & landscape upgrades
- District Pipeline leak repair
- Graywater
- Pool covers
- Rainwater harvesting

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Water Supply Management Program 2040

Conservation Program Savings & Costs

Level	Description	# of Measures	2040 Water Savings (MGD)	Average Incremental Dry Year Unit Cost ($/AF)
A	Natural savings	11	19	NA
B	Natural savings + 10	39	29	$800
C	Current program equivalent	51	37	$6,200
D	Current program equivalent + 2	53	39	$13,400
E	Maximum voluntary program	58	41	$19,700

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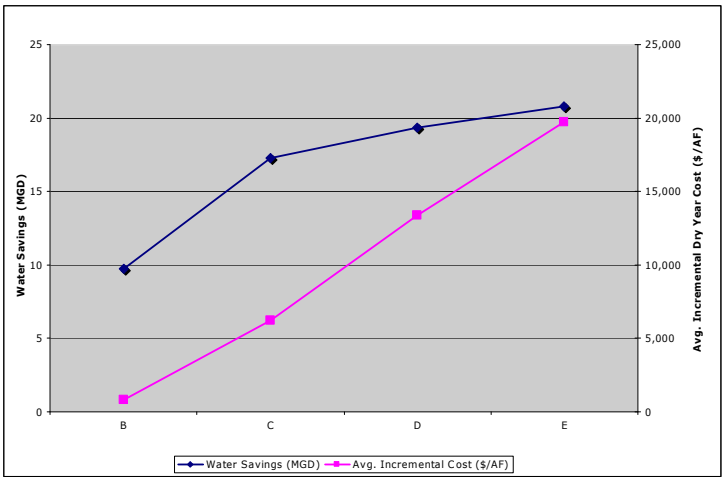
Water Supply Management Program 2040

Conservation Program Savings & Costs



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Water Supply Management Program 2040

Component Categories

1. Rationing
2. Conservation
3. Recycled & Raw Water
4. Supplemental Supply

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Water Supply Management Program 2040

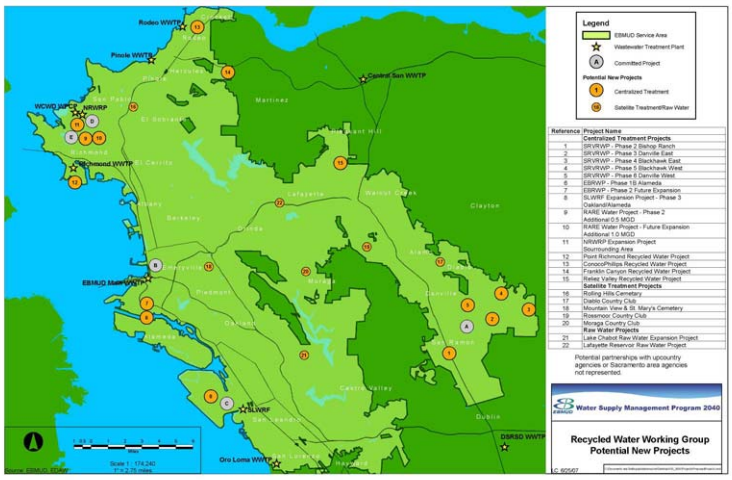
Recycled & Raw Water

3 Categories:

1. Committed Projects (9 MGD)
2. Potential New Projects within EBMUD Service Area
   - Centralized Treatment
   - Satellite Treatment
   - Raw Water
   - Groundwater (non-potable use)
   - Salt Water (fire suppression)
3. Potential Partnerships with Upcountry Agencies

Water Supply Management Program 2040

Potential Projects



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Water Supply Management Program 2040

Component Categories

1. Rationing
2. Conservation
3. Recycled & Raw Water
4. Supplemental Supply

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Water Supply Management Program 2040

Supplemental Supply

Statewide
- Sites Reservoir
- Temperance Flat Reservoir
- Expanded Los Vaqueros Reservoir
- Semitropic Groundwater Bank

Central Valley
- Bixler/Delta Diversion
- Duck Creek
- Sacramento Basin Groundwater Banking/Exchange
- San Joaquin Basin Groundwater Banking/Exchange

Local (East Bay)
- Bayside GW - Phase 2
- Bollinger Canyon
- Buckhorn Canyon
- Cull Canyon
- Curry Canyon
- Fog Capture
- Kellogg Canyon
- Low Energy Application for Desalination (LEAD) at C&H Sugar
- Off-Shore Desalination
- Regional Desalination
- Water Bags

Upcountry
- Camanche
- Inter-Regional Conjunctive Use Project
- Lower Bear
- Middle Bar
- Pardee

← **Water Transfers** (short or long-term) →

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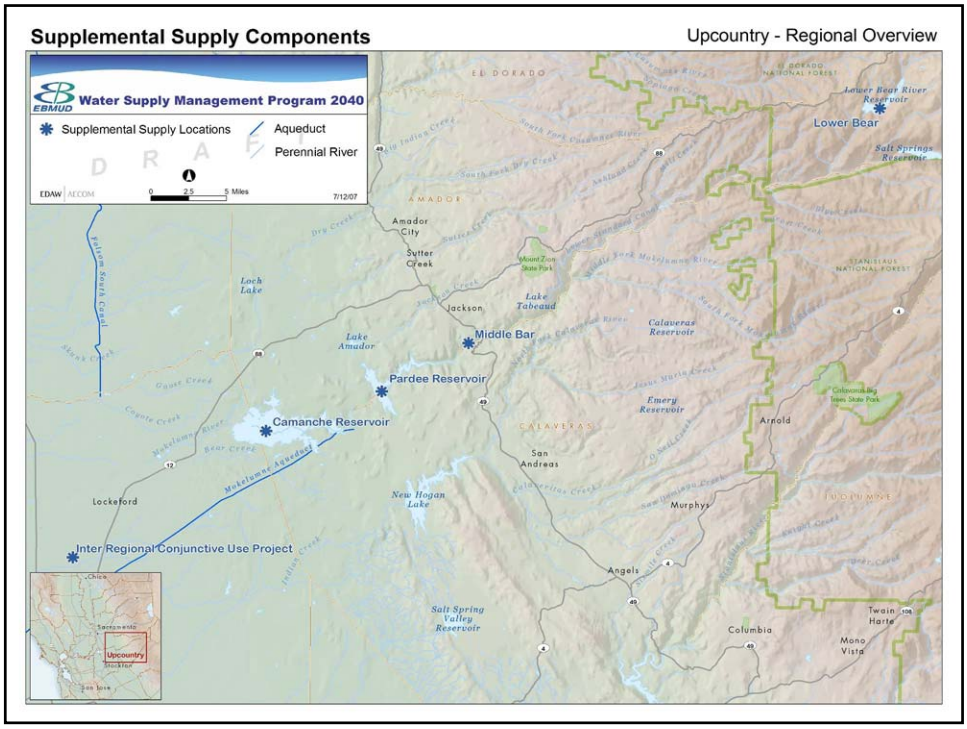
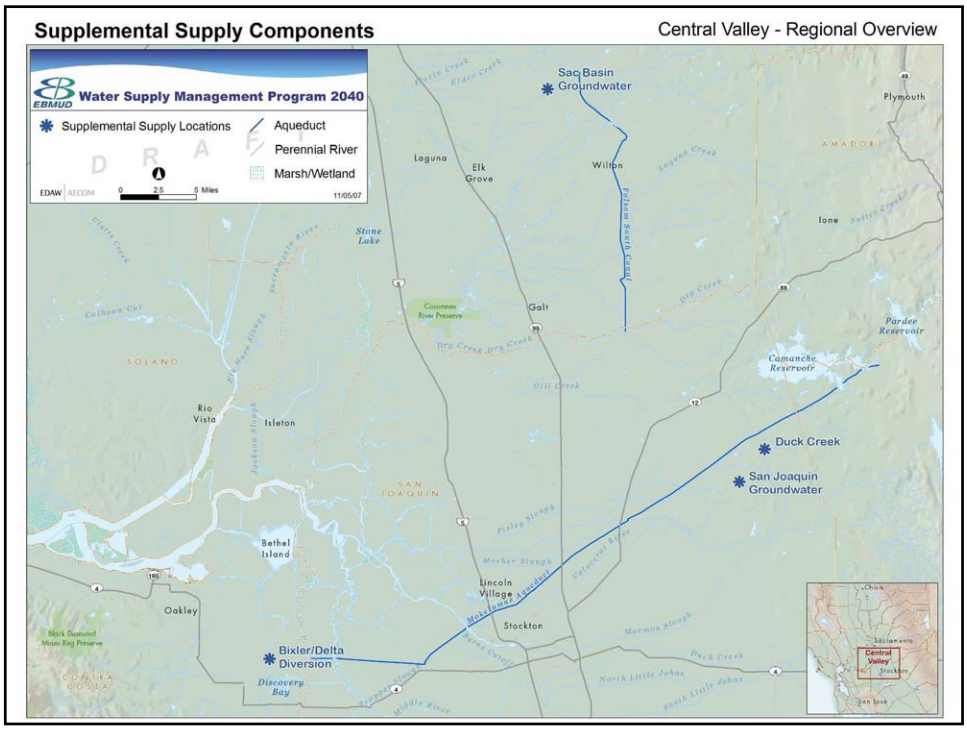
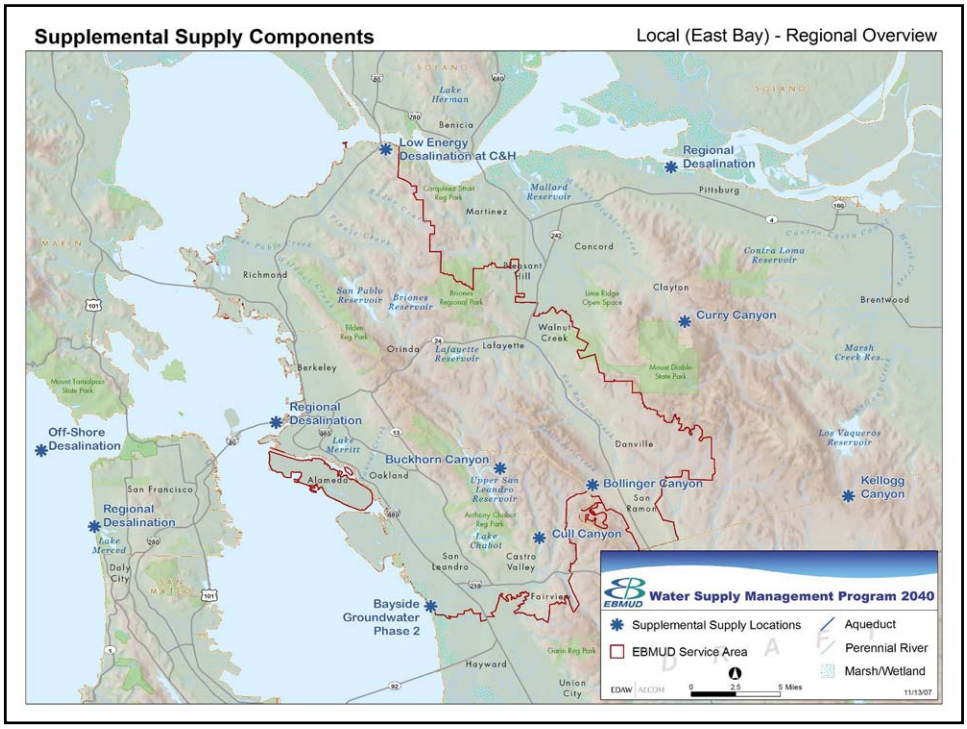
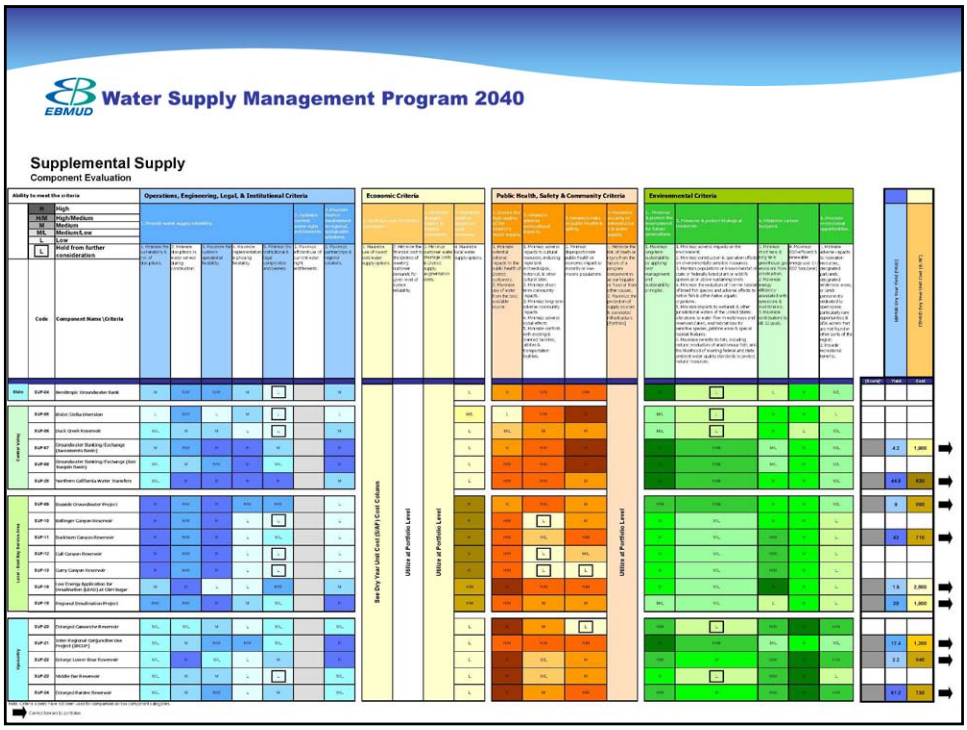

Supplemental Supply Components
Upcountry - Regional Overview
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
D R A F T
EDAW | AECOM
0 2.5 5 Miles
7/12/07
Lower Bear
Amador City
Sutter Creek
Jackson
Middle Bar
Pardee Reservoir
Camanche Reservoir
Lockeford
Inter Regional Conjunctive Use Project
Arnold
San Andreas
Murphys
Angels
Columbia
Twain Harte
Mono Vista
Upcountry


Supplemental Supply Components
Central Valley - Regional Overview
Water Supply Management Program 2040
Supplemental Supply Locations
Aqueduct
Perennial River
Marsh/Wetland
D R A F T
EDAW | AECOM
0 2.5 5 Miles
11/05/07
Sac Basin Groundwater
Plymouth
Laguna
Elk Grove
Wilton
Galt
Ione
Pardee Reservoir
Camanche Reservoir
Rio Vista
Isleton
Duck Creek
San Joaquin Groundwater
Bethel Island
Lincoln Village
Stockton
Oakley
Bixler/Delta Diversion
Discovery Bay
Central Valley


Supplemental Supply Components
Local (East Bay) - Regional Overview
Low Energy Desalination at C&H
Regional Desalination
Off-Shore Desalination
Regional Desalination
Regional Desalination
Buckhorn Canyon
Bollinger Canyon
Cull Canyon
Curry Canyon
Kellogg Canyon
Bayside Groundwater Phase 2
Water Supply Management Program 2040
Supplemental Supply Locations
EBMUD Service Area
Aqueduct
Perennial River
Marsh/Wetland
11/13/07


Water Supply Management Program 2040
Supplemental Supply
Component Evaluation

Water Supply Management Program 2040

Evaluation of Climate Change Impacts

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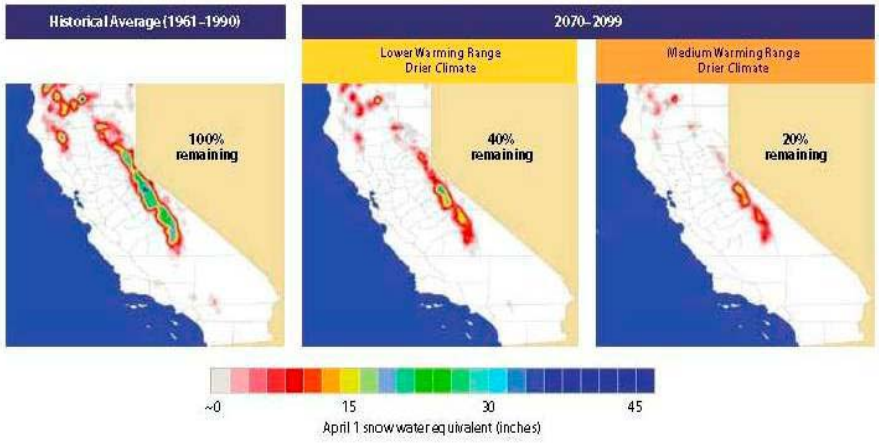
Water Supply Management Program 2040

Decreasing California Snowpack



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Source: Our Changing Climate, Summary Report from the CA Climate Change Center, 2006

Water Supply Management Program 2040

Potential Impacts on EBMUD

- Increased water demands for outdoor uses
- Change in timing of Mokelumne River spring runoff
- Increased challenges in reservoir management
- Change in volume of Mokelumne River runoff
- Increased flooding resulting in infrastructure impacts
- Change in snowpack
- Change in drought frequency & duration

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Water Supply Management Program 2040

Portfolio Building

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Water Supply Management Program 2040

Water Supply Portfolios

Building a Portfolio from Project Components

Components			
Conservation	**Rationing**	**Recycled Water**	**Supp. Supply**
A	0%	1	1
B	10%	2	2
C	15%	3	3
D	25%	4	4
E		5	5
		6	6
		⋮	⋮
		22	25

Example Portfolio 1

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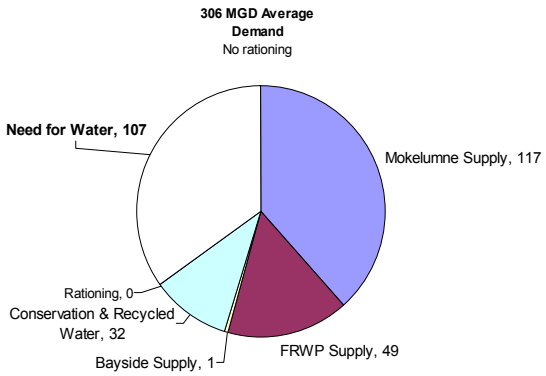
Water Supply Management Program 2040

2040 Water Supply

2040 Water Supply
Average during the 3-year Drought Planning Sequence



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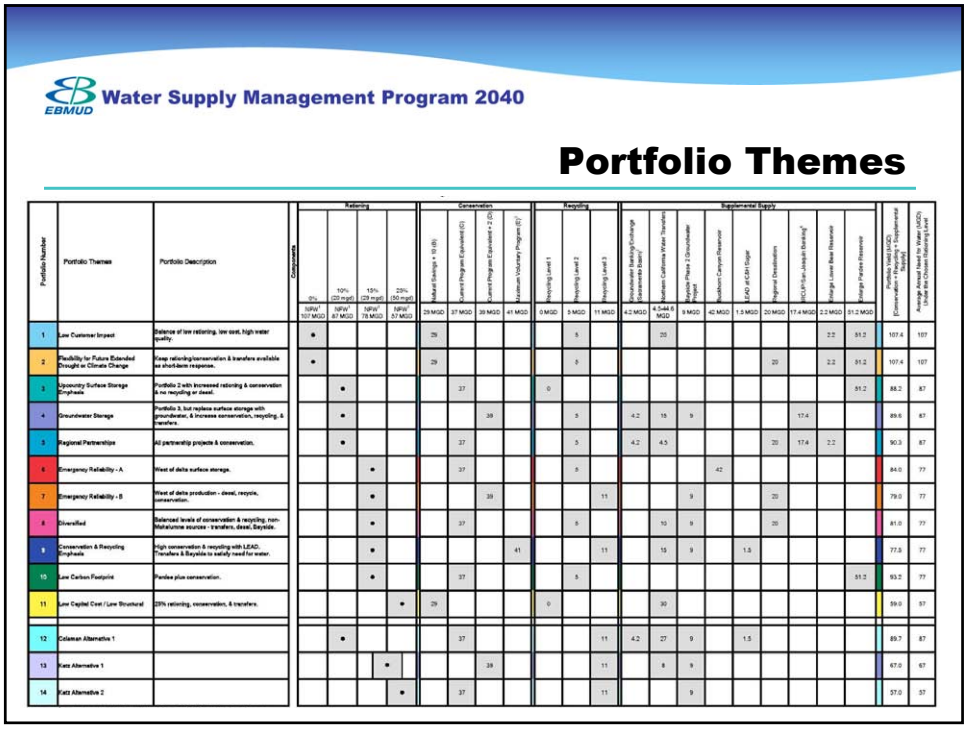
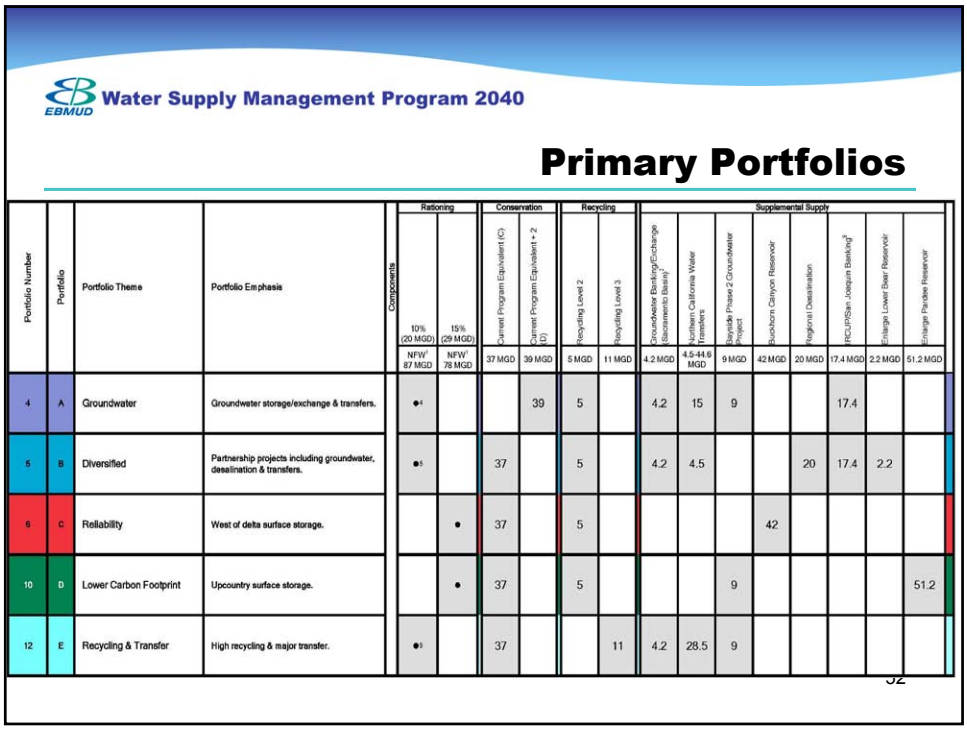


Water Supply Management Program 2040

Portfolio Themes

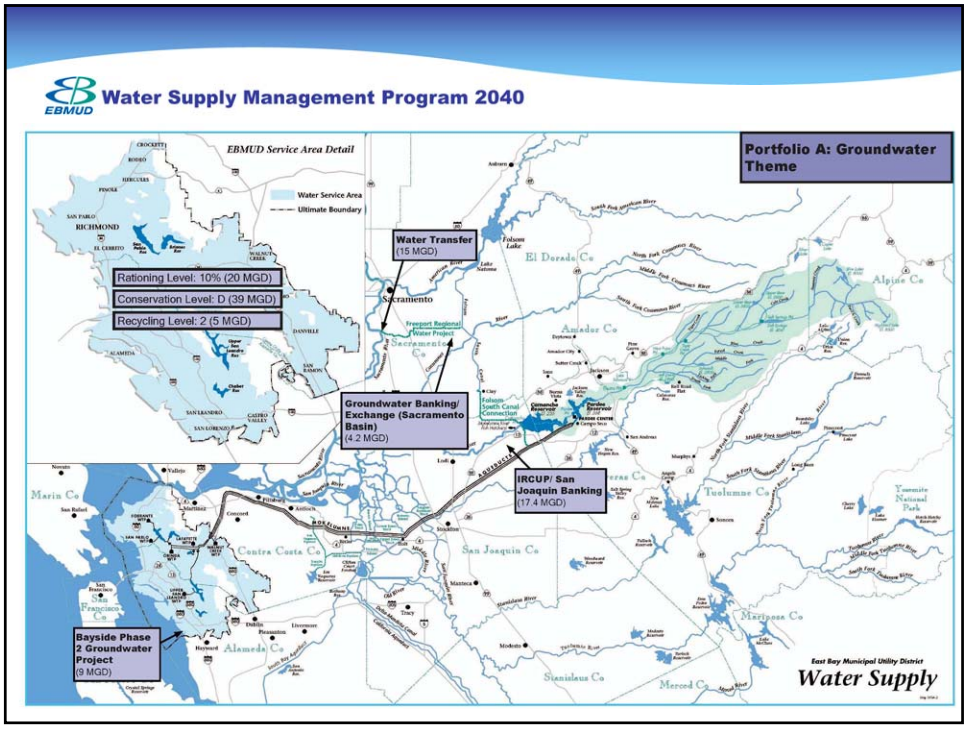
Portfolio Number	Portfolio Theme	Portfolio Description	Components	Rationing				Conservation				Recycling			Supplemental Supply								Portfolio Yield (mgd) [Conservation + Recycling + Supplemental Supply]	Average Annual Need for Water (mgd) [Year 2040 Demand less Yield]
				0% NFW[1] 107 MGD	10% (20 mgd) NFW[1] 87 MGD	15% (29 mgd) NFW[1] 78 MGD	23% (50 mgd) NFW[1] 57 MGD	Natural Savings + SI (B) 29 MGD	Current Program Equivalent (C) 37 MGD	Current Program Equivalent + 2 (D) 39 MGD	Maximum Voluntary Program (E)[2] 41 MGD	Recycling Level 1 0 MGD	Recycling Level 2 5 MGD	Recycling Level 3 11 MGD	Groundwater Banking/Exchange (Sacramento Basin)[3] 4.2 MGD	Northern California Water Transfers 4.5-44.6 MGD	Bayside Phase 2 Groundwater Project 9 MGD	Buckhorn Canyon Reservoir 42 MGD	LEAD #1/LEAD Finger 1.5 MGD	Regional Desalination 20 MGD	RCU/PSan Joaquin Banking[4] 17.4 MGD	Enlarge Lower Bear Reservoir 2.2 MGD	Enlarge Pardee Reservoir 51.2 MGD		
1	Low Customer Impact	Balance of low rationing, low cost, high water quality.		•				29					5			20						2.2	51.2	107.4	107
2	Flexibility for Future Extended Drought or Climate Change	Keep rationing/conservation & transfers available as short-term response.		•				29					5									2.2	51.2	107.4	107
3	Upcountry Surface Storage Emphasis	Portfolio 2 with increased rationing & conservation & no recycling or deasl.			•				37			0											51.2	88.2	87
4	Groundwater Storage	Portfolio 3, but replace surface storage with groundwater, & increase conservation, recycling, & transfers.			•					39			5		4.2	15	9				17.4			89.6	87
5	Regional Partnerships	All partnership projects & conservation.			•				37				5		4.2	4.5				20	17.4	2.2		90.3	87
6	Emergency Reliability - A	West of delta surface storage.				•			37				5					42						84.0	77
7	Emergency Reliability - B	West of delta production - deasl, recycle, conservation.				•				39				11			9			20				79.0	77
8	Diversified	Balanced levels of conservation & recycling, non-Mokelumne sources - transfers, deasl, Bayside.				•			37				5			10	9			20				81.0	77
9	Conservation & Recycling Emphasis	High conservation & recycling with LEAD, Transfers & Bayside to satisfy need for water.				•					41			11		15	9		1.5					77.5	77
10	Low Carbon Footprint	Pardee plus conservation.				•			37				5										51.2	93.2	77
11	Low Capital Cost / Low Structural	23% rationing, conservation, & transfers.					•	29				0				30								59.0	57
12	Coleman Alternative 1				•				37					11	4.2	27	9		1.5					89.7	87
13	Katz Alternative 1					•				39				11		8	9							67.0	67
14	Katz Alternative 2						•		37					11			9							57.0	57

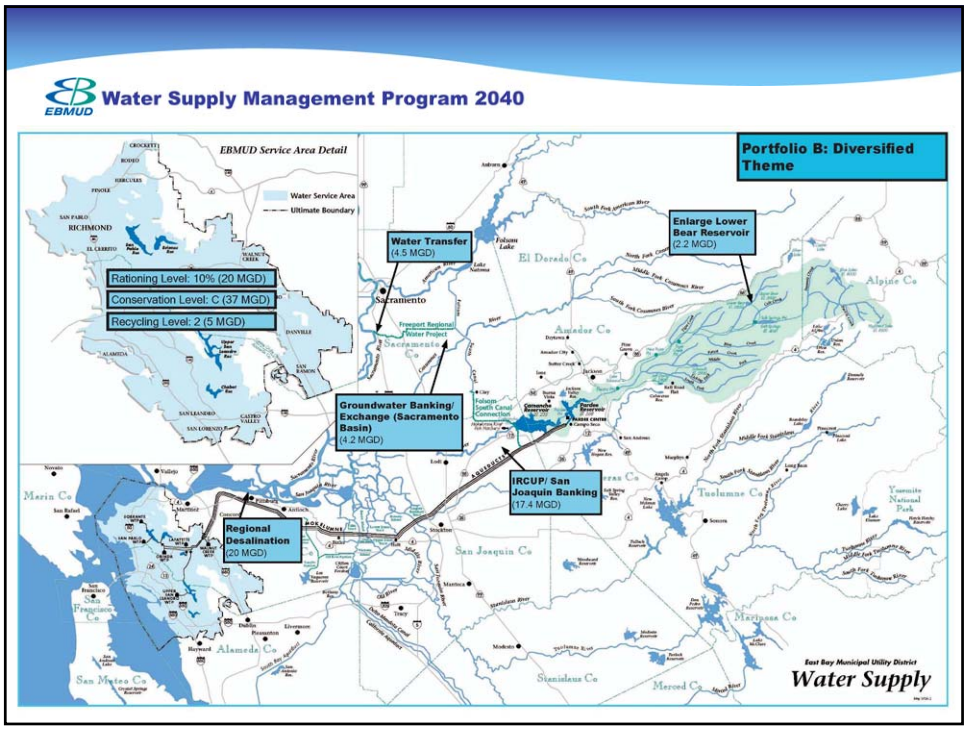


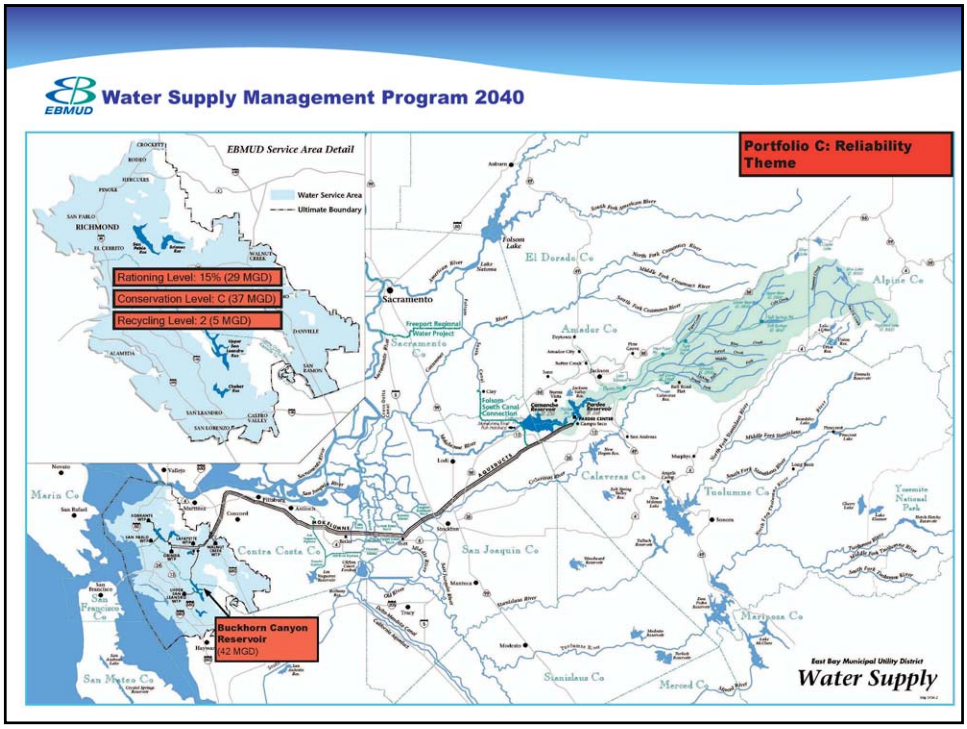
Water Supply Management Program 2040

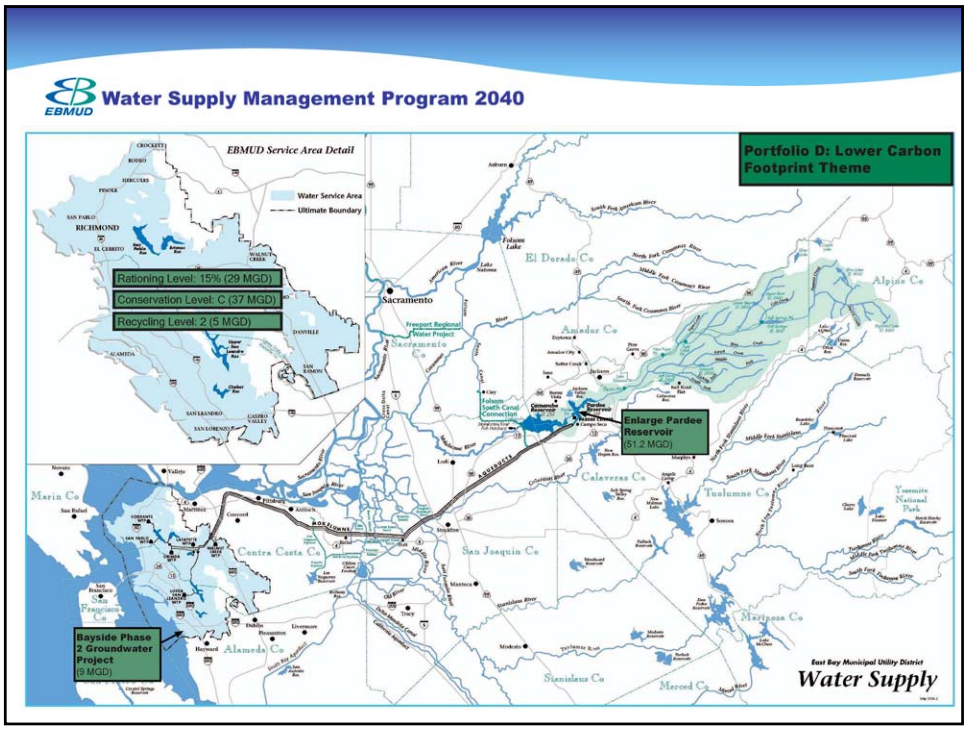
Primary Portfolios

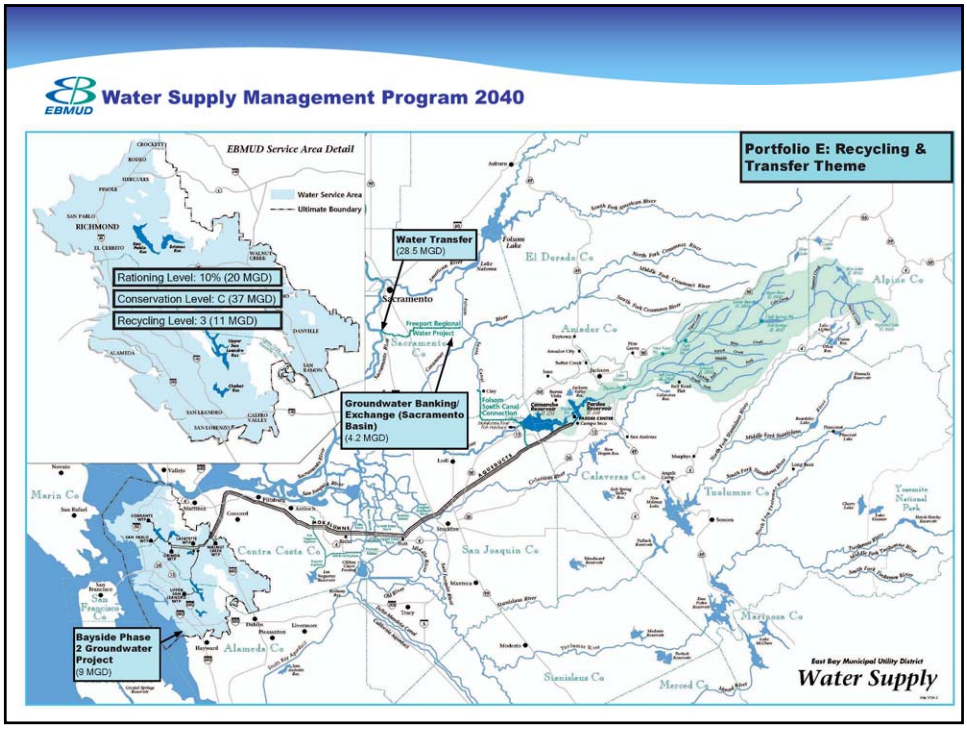
Portfolio Number	Portfolio	Portfolio Theme	Portfolio Emphasis	Components	Rationing		Conservation		Recycling		Supplemental Supply							
					10% (20 MGD) NFW[1] 87 MGD	15% (29 MGD) NFW[1] 78 MGD	Current Program Equivalent (C) 37 MGD	Current Program Equivalent + 2 (D) 39 MGD	Recycling Level 2 5 MGD	Recycling Level 3 11 MGD	Groundwater Banking/Exchange (Sacramento Basin)[3] 4.2 MGD	Northern California Water Transfers 4.5-44.6 MGD	Bayside Phase 2 Groundwater Project 9 MGD	Buckhorn Canyon Reservoir 42 MGD	Regional Desalination 20 MGD	RCU/PSan Joaquin Banking[4] 17.4 MGD	Enlarge Lower Bear Reservoir 2.2 MGD	Enlarge Pardee Reservoir 51.2 MGD
4	A	Groundwater	Groundwater storage/exchange & transfers.		•[4]			39	5		4.2	15	9			17.4		
5	B	Diversified	Partnership projects including groundwater, desalination & transfers.		•[5]		37		5		4.2	4.5			20	17.4	2.2	
6	C	Reliability	West of delta surface storage.			•	37		5					42				
10	D	Lower Carbon Footprint	Upcountry surface storage.			•	37		5				9					51.2
12	E	Recycling & Transfer	High recycling & major transfer.		•[5]		37			11	4.2	28.5	9					

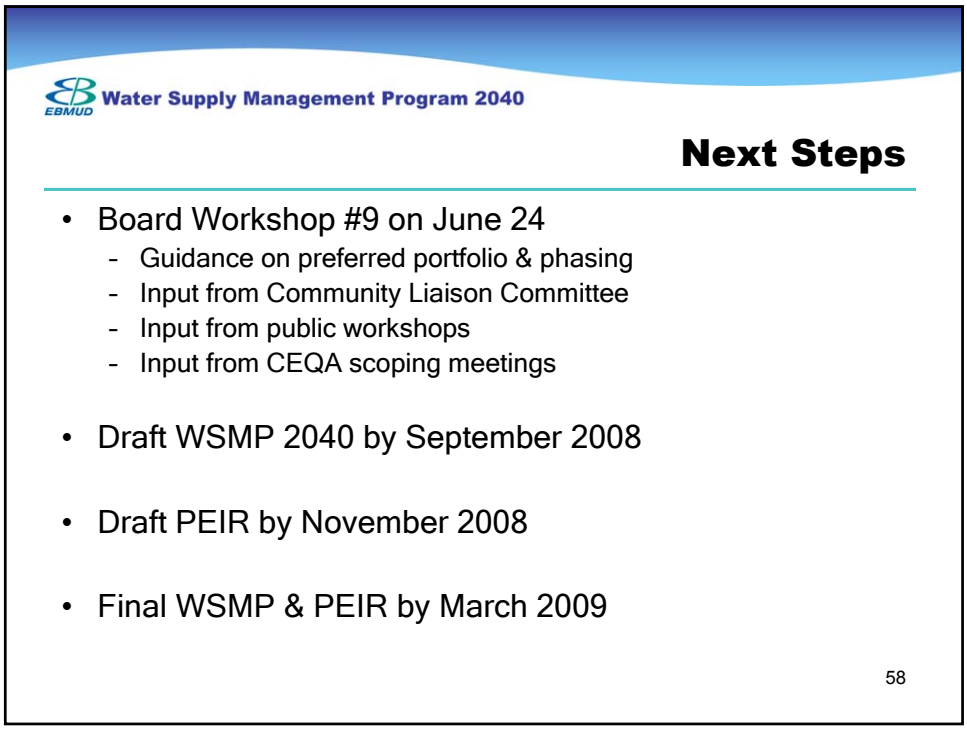

Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio A: Groundwater Theme
Water Transfer (15 MGD)
Rationing Level: 10% (20 MGD)
Conservation Level: D (39 MGD)
Recycling Level: 2 (5 MGD)
Groundwater Banking/ Exchange (Sacramento Basin) (4.2 MGD)
IRCUP/ San Joaquin Banking (17.4 MGD)
Bayside Phase 2 Groundwater Project (9 MGD)
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio B: Diversified Theme
Water Transfer (4.5 MGD)
Enlarge Lower Bear Reservoir (2.2 MGD)
Rationing Level: 10% (20 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Groundwater Banking/ Exchange (Sacramento Basin) (4.2 MGD)
IRCUP/ San Joaquin Banking (17.4 MGD)
Regional Desalination (20 MGD)
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio C: Reliability Theme
Water Service Area
Ultimate Boundary
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Buckhorn Canyon Reservoir
(42 MGD)
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Portfolio D: Lower Carbon Footprint Theme
Water Service Area
Ultimate Boundary
Rationing Level: 15% (29 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 2 (5 MGD)
Enlarge Pardee Reservoir
(51.2 MGD)
Bayside Phase 2 Groundwater Project
(9 MGD)
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
EBMUD Service Area Detail
Water Service Area
Ultimate Boundary
Portfolio E: Recycling & Transfer Theme
Water Transfer
(28.5 MGD)
Rationing Level: 10% (20 MGD)
Conservation Level: C (37 MGD)
Recycling Level: 3 (11 MGD)
Groundwater Banking/ Exchange (Sacramento Basin)
(4.2 MGD)
Bayside Phase 2 Groundwater Project
(9 MGD)
Sacramento
El Dorado Co
Amador Co
Alpine Co
Calaveras Co
Tuolumne Co
San Joaquin Co
Contra Costa Co
Alameda Co
Stanislaus Co
Merced Co
Mariposa Co
Marin Co
East Bay Municipal Utility District
Water Supply


Water Supply Management Program 2040
Next Steps
• Board Workshop #9 on June 24
- Guidance on preferred portfolio & phasing
- Input from Community Liaison Committee
- Input from public workshops
- Input from CEQA scoping meetings
• Draft WSMP 2040 by September 2008
• Draft PEIR by November 2008
• Final WSMP & PEIR by March 2009
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