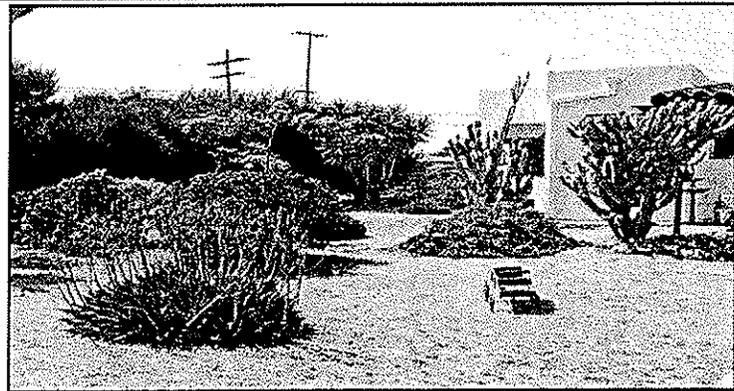
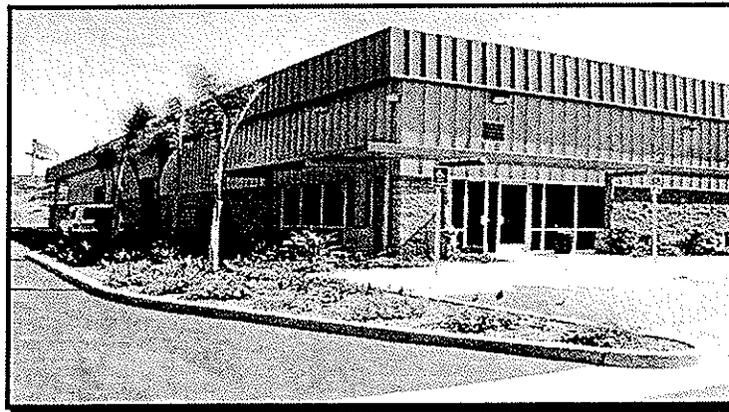
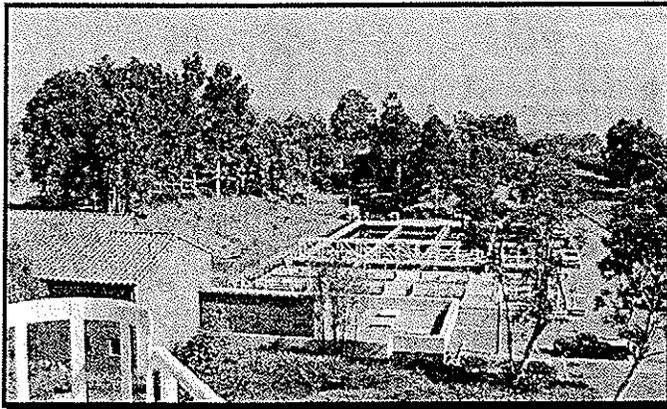




Sweetwater Authority

2005 Urban Water Management Plan

December 2005





SWEETWATER AUTHORITY

505 GARRETT AVENUE
POST OFFICE BOX 2328
CHULA VISTA, CALIFORNIA 91912-2328
(619) 420-1413
FAX (619) 425-7469
<http://www.sweetwater.org>

GOVERNING BOARD
W. D. "BUD" POCKLINGTON, CHAIR
R. MITCHEL BEAUCHAMP, VICE CHAIR
JAMES C. ALKIRE
JAMES "JIM" DOUD
RON MORRISON
MARY SALAS
MARGARET COOK WELSH
MARISA FARPÓN
SECRETARY

DENNIS A. BOSTAD
GENERAL MANAGER
MARK N. ROGERS
OPERATIONS MANAGER

December 16, 2005

California Department of Water Resources
Office of Water Use Efficiency
Post Office Box 942836
Sacramento, CA 94236-0001
Attn: Dave Todd, Supervising Land and Water Use Analyst

Subject: Sweetwater Authority – 2005 Urban Water Management Plan

Dear Mr. Todd:

In accordance with Water Code Section 10644 of the Urban Water Management Planning Act, please find enclosed three (3) hard copies and one (1) compact disc containing an electronic version of Sweetwater Authority's (Sweetwater) 2005 Urban Water Management Plan (UWMP). This plan was adopted by Sweetwater's Governing Board at its November 23, 2005 meeting.

As presented in Section 1.1.1 of the UWMP, Sweetwater coordinated the development of the plan in accordance with Water Code Section 10631. This coordination included exchanging water use projections with the San Diego County Water Authority (Water Authority). Subsequent to the adoption by Sweetwater's Governing Board, Sweetwater received a memorandum from the Water Authority officially transmitting the water supply information as required under Section 10631 of the Water Code. A copy of this memorandum and supporting information is included. As noted above, however, the Water Authority and Sweetwater coordinated throughout development of the UWMPs, with the Water Authority officially transmitting the final water supply information to Sweetwater following adoption of its 2005 UWMP.

Finally, in accordance with Water Code Section 10644, Sweetwater, by copy of this letter, is transmitting a copy of its 2005 UWMP to the Water Authority, San Diego County, and the Cities of National City and Chula Vista.

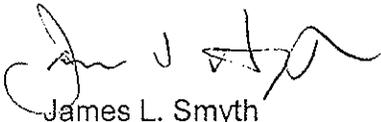
*A Public Water Agency
Serving National City, Chula Vista and Surrounding Areas*

Mr. Dave Todd, Supervising Land and Water Use Analyst
Re: Sweetwater Authority – 2005 Urban Water Management Plan
December 16, 2005
Page 2 of 3

Please feel free to contact Mr. Jack Adam at (619) 409-6753, if you have any questions or would like additional information.

Sincerely,

SWEETWATER AUTHORITY



James L. Smyth
Director of Engineering

JLS:JA:vl

enclosures: 3 hard copies of Sweetwater's 2005 UWMP
1 compact disc with electronic file

cc: Government Publications Section
California State Library
914 Capitol Mall, MS E-29
P.O. Box 942837
Sacramento, CA 94237-0001

enclosures:
1 hard copy of Sweetwater's 2005 UWMP
1 compact disc with electronic file

Mr. Alex Al-Agha, City Engineer
City of Chula Vista
Public Works Department
Engineering Division
276 Fourth Avenue
Chula Vista, CA 91910

enclosures:
1 hard copy of Sweetwater's 2005 UWMP
1 compact disc with electronic file

Mr. Dave Todd, Supervising Land and Water Use Analyst
Re: Sweetwater Authority – 2005 Urban Water Management Plan
December 16, 2005
Page 3 of 3

Lin Wurbs
Assistant City Manager
City of National City
1243 National City Boulevard
National City, CA 91950

enclosures:
1 hard copy of Sweetwater's 2005 UWMP
1 compact disc with electronic file

Mr. Stephen M. Kirkpatrick, City Engineer
City of National City
Engineering Department
1243 National City Boulevard
National City, CA 91950

enclosures:
1 hard copy of Sweetwater's 2005 UWMP
1 compact disc with electronic file

Ms. Dana Frieauf
San Diego County Water Authority
4677 Overland Avenue
San Diego, CA 92123

enclosures:
1 hard copy of Sweetwater's 2005 UWMP
1 compact disc with electronic file

Mr. John Snyder, Director of Public Works
County of San Diego
Public Works
Engineering Department
5201 Ruffin Road, MS 0382
San Diego, CA 92123-1295

enclosures:
1 hard copy of Sweetwater's 2005 UWMP
1 compact disc with electronic file



MEMORANDUM

December 1, 2005

TO: Member Agency Managers

FROM: Ken Weinberg, Director of Water Resources *KW*

RE: Information on Water Authority Supplies included in 2005 Urban Water Management Plan as required under California Water Code Section 10631 (k)

The purpose of this memorandum is to address California Water Code Section 10631 (k) of the Urban Water Management Planning Act (Act). This section requires the exchange of supply and demand information between the wholesale agency and its member agencies. The Water Authority is to provide information that identifies and quantifies, to the extent practicable, the existing and planned sources of water available from the Water Authority under multiple dry-year, single dry-year, and average year conditions, in five-year increments for the 20-year term required under the Act.

This supply information is included in the Water Authority's 2005 Urban Water Management Plan (2005 Plan), adopted on November 17, 2005. A copy of the 2005 Plan is attached. The Water Authority's supplies include deliveries from the Metropolitan Water District (Metropolitan). Documentation on Metropolitan's supplies is included in its 2005 Regional Urban Water Management Plan, adopted on November 8, 2005. In addition, attached is a memorandum from Metropolitan, which contains supply reliability tables documenting long-term reliability, consistent with requirements of the Act. As stated in Section 8 of the Water Authority's 2005 Plan, if the projected Water Authority and member agency supplies are developed as planned, along with implementation of Metropolitan's Integrated Resources Plan, no shortages are anticipated within the Water Authority's service area under normal, single dry-year, or multiple dry-water years through 2030.

Member agency input into development of the Water Authority's 2005 Plan was critical to its preparation and ultimate adoption by the Board. The Water Authority would like to thank its member agencies for their assistance and input during this yearlong process. The table below summarizes the activities that occurred between our agencies during this effort:

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DEC 05 2005

SWEETWATER AUTHORITY
ADMINISTRATION

Date	Water Authority Activities
September 2004	Presented to member agencies an overview of CWA-MAIN Model used to develop regional water demand forecast.
October 2004	Held kick-off meeting with agencies to initiate update of local supply and conservation projections.
February 2005	Hosted DWR Workshop on plan preparation and additional review of local supply and conservation projections.
March – April 2005	Met individually with several member agencies on draft preliminary demand forecast and local supply and conservation projections.
May 2005	Distributed preliminary water demand forecast to member agencies. Forecast included demands on the Water Authority by member agency.
May 2005	Hosted member agency meeting to review preparation of Metropolitan’s 2005 RUWMP and discuss additional coordination issues.
June 2005	Held technical meeting with member agencies to review water demand forecast.
September 2005	Distributed updated water demand forecast that was revised based on member agency input.
September 2005	Distributed member agency draft 2005 Plan for member agency technical review.
October 2005	Addressed member agencies’ comments in public review draft of 2005 Plan that was distributed to Board members and made available to public.
November 2005	Water Authority’s 2005 Plan adopted by Board.

In addition to preparation of the urban water management plan every five years, the Water Authority prepares an annual water supply report that documents implementation of the Water Authority’s planned supply projects and programs. This report is prepared in accordance with subdivision (a) of Section 8.00.050 of the Water Authority’s Administrative Code, which states: “The General Manager shall provide each Authority member agency and the County of San Diego and each city in the County of San Diego with a copy of the Authority’s most recently adopted Urban Water Management Plan and an annual statement regarding the Authority’s water supplies and implementation of Authority’s plans and programs to meet the future water supply requirements of its member agencies as determined by the Authority pursuant to law and the memorandum of agreement between the Authority and the San Diego Association of Governments.” Staff anticipates preparing the next annual report towards the end of 2006 and will provide the document following its approval by the Water Authority’s Board of Directors.

Thank you again for your assistance in preparation of the Water Authority’s 2005 Plan. Please contact Dana Friehauf, Principal Water Resources Specialist, at dfriehauf@sdewa.org or 858-522-6749, if you have any questions on the information provided in this memorandum.

Attachments



MWD

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Date: August 18, 2005
To: Urban Water Management Plan Coordinators
From: Michael Hurley, Water Resource Management Group
Subject: Reliability Tables for the 2005 RUWMP

California Water Code §10631 of the Urban Water Management Planning Act (Act) requires wholesale water agencies to provide urban water suppliers that rely upon that wholesale agency information that identifies and quantifies, to the extent practicable, the existing and planned sources of water available from the wholesale agency under multiple dry-year, single dry-year and average year conditions, in five-year increments for the 20-year term required under the Act

Attached are the final draft reliability tables documenting Metropolitan's long-term reliability consistent with the requirements of the Act. The tables show supplies and demands under multiple dry-year, single dry-year and average year conditions. Also included are the existing and planned supplies from In-basin, California Aqueduct and Colorado River Aqueduct sources used to develop the reliability tables.

Additionally, I've attached a slightly revised draft data set at the regional level based on comments regarding local supplies from some of the member agencies.

If you have any questions or comments, please contact me at (213) 217-6221 or mhurley@mwdh2o.com.

In Basin Storage Activities
Program Capabilities
Year 2010
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	297,500	510,000	0
Flexible Storage in Castaic & Perris Groundwater Conjunctive-use	73,000	219,000	0
North Las Posas Storage Prop 13 Storage	47,000 64,000	47,000 64,000	0 0
Subtotal of Current Programs	481,500	840,000	0
Programs Under Development			
Groundwater Conjunctive-use Raymond Basin Prop 13 Storage Programs Additional Programs ¹	22,000 1,000 55,000 78,000	22,000 1,000 55,000 78,000	0 0 0 0
Subtotal of Proposed Programs			
Maximum Supply Capability	559,500	918,000	0

¹ Includes expansions of existing programs

In Basin Storage Activities
Program Capabilities
 Year 2015
 (acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	296,200	507,800	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use	47,000	47,000	0
North Las Posas Storage	64,000	64,000	0
Prop 13 Storage	480,200	837,800	0
Subtotal of Current Programs			
Programs Under Development			
Groundwater Conjunctive-use		22,000	0
Raymond Basin		1,000	0
Prop 13 Storage Programs		80,000	0
Additional Programs ¹		103,000	0
Subtotal of Proposed Programs			
Maximum Supply Capability	583,200	940,800	0

¹ Includes expansions of existing programs

In Basin Storage Activities
 Program Capabilities
 Year 2020
 (acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs	278,800	477,900	0
Metropolitan Surface Storage (DVL, Mathews, Skinner)	0	0	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use	47,000	47,000	0
North Las Posas Storage	64,000	64,000	0
Prop 13 Storage	462,800	807,900	0
Subtotal of Current Programs			
Programs Under Development			
Groundwater Conjunctive-use	22,000	22,000	0
Raymond Basin	1,000	1,000	0
Prop 13 Storage Programs	80,000	80,000	0
Additional Programs ¹	103,000	103,000	0
Subtotal of Proposed Programs			
Maximum Supply Capability	565,800	910,900	0

¹ Includes expansions of existing programs

In Basin Storage Activities
Program Capabilities
 Year 2025
 (acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	265,000	454,300	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use	47,000	47,000	0
North Las Posas Storage	64,000	64,000	0
Prop 13 Storage	449,000	784,300	0
Subtotal of Current Programs			
Programs Under Development			
Groundwater Conjunctive-use			0
Raymond Basin	22,000	22,000	0
Prop 13 Storage Programs	1,000	1,000	0
Additional Programs ¹	80,000	80,000	0
Subtotal of Proposed Programs	103,000	103,000	0
Maximum Supply Capability	552,000	887,300	0

¹ Includes expansions of existing programs

In Basin Storage Activities
 Program Capabilities
 Year 2030
 (acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs:			
Metropolitan Surface Storage	265,000	454,300	0
(DVL, Mathews, Skinner)			
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use	47,000	47,000	0
North Las Posas Storage	64,000	64,000	0
Prop 13 Storage	449,000	784,300	0
Subtotal of Current Programs			
Programs Under Development:			
Groundwater Conjunctive-use	22,000	22,000	0
Raymond Basin	1,000	1,000	0
Prop 13 Storage Programs	80,000	80,000	0
Additional Programs ¹	103,000	103,000	0
Subtotal of Proposed Programs			
Maximum Supply Capability	552,000	887,300	0

¹ Includes expansions of existing programs and North Las Posas Phase 3

California Aqueduct
Program Capabilities
Year 2010
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1972-2004)
Current Programs			
SWP Deliveries ^{1,2}	509,000	175,000	1,472,000
San Luis Carryover ³	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	25,600	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	911,600	777,000	1,772,000
Programs Under Development			
Delta Improvements ⁴	55,000	55,000	185,000
Market Transfer Options	150,000	150,000	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	0	0	0
Subtotal of Proposed Programs	330,000	330,000	185,000
Maximum Supply Capability	1,241,600	1,107,000	1,957,000

¹ Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

² Multiple and Single Dry year figures include DWCV Table A supplies

³ Includes DWCV carryover

⁴ Includes Phase 8 and increased pumping capacity

California Aqueduct
Program Capabilities
Year 2015
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
SWP Deliveries ^{1,2}	509,000	175,000	1,472,000
San Luis Carryover ³	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	25,600	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	911,600	777,000	1,772,000
Programs Under Development			
Delta Improvements ⁴	55,000	55,000	185,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	34,500	34,500	0
Subtotal of Proposed Programs	214,500	214,500	185,000
Maximum Supply Capability	1,126,100	991,500	1,957,000

¹ Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

² Multiple and Single Dry year figures include DWCV Table A supplies

³ Includes DWCV carryover

⁴ Includes Phase 8 and increased pumping capacity

FINAL DRAFT

California Aqueduct
Program Capabilities
Year 2020
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs^{1,2}			
SWP Deliveries ^{1,2}	509,000	175,000	1,472,000
San Luis Carryover ³	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	25,600	5,000	
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	911,600	777,000	1,772,000
Programs Under Development			
Delta Improvements ⁴	110,000	110,000	240,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	34,500	34,500	0
Subtotal of Proposed Programs	269,500	269,500	240,000
Maximum Supply Capability	1,181,100	1,046,500	2,012,000

¹ Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

² Multiple and Single Dry year figures include DWCV Table A supplies

³ Includes DWCV carryover

⁴ Includes Phase 8 and increased pumping capacity

FINAL DRAFT

California Aqueduct
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
SWP Deliveries ^{1,2}	509,000	175,000	1,472,000
San Luis Carryover ³	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	25,600	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	911,600	777,000	1,772,000
Programs Under Development			
Delta Improvements ⁴	110,000	110,000	240,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	34,500	34,500	0
Subtotal of Proposed Programs	269,500	269,500	240,000
Maximum Supply Capability	1,181,100	1,046,500	2,012,000

¹ Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

² Multiple and Single Dry year figures include DWCV Table A supplies

³ Includes DWCV carryover

⁴ Includes Phase 8 and increased pumping capacity

FINAL DRAFT

California Aqueduct
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-97)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
SWP Deliveries ^{1,2}	509,000	175,000	1,472,000
San Luis Carryover ³	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	25,600	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	911,600	777,000	1,772,000
Programs Under Development			
Delta Improvements ⁴	110,000	110,000	240,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	34,500	34,500	0
Subtotal of Proposed Programs	269,500	269,500	240,000
Maximum Supply Capability	1,181,100	1,046,500	2,012,000

¹ Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

² Multiple and Single Dry year figures include DWCV Table A supplies

³ Includes DWCV carryover

⁴ Includes Phase 8 and increased pumping capacity

FINAL DRAFT

Colorado River Aqueduct
 Program Capabilities
 Year 2010
 (acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Base Apportionment – Priority 4	526,000	526,000	526,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	30,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	722,000	722,000	711,000
Programs Under Development			
Hayfield Storage Program	0	0	0
Lower Coachella Storage Program	0	0	0
Chuckwalla Storage Program	0	0	0
Salton Sea Restoration Transfer	95,000	95,000	0
Subtotal of Proposed Programs	95,000	95,000	0
Less: Coachella SWP/QSA Transfer	0	0	0
Maximum Metropolitan Supply Capability	817,000	817,000	711,000
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	60,000	70,000	70,000
Coachella & All-American Canals Lining	93,700	93,700	93,700
Maximum CRA Supply Capability	970,700	980,700	874,700
Maximum Expected CRA Deliveries	970,700	980,700	874,700

FINAL DRAFT

Colorado River Aqueduct

Program Capabilities

Year 2015

(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	20,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	699,000	699,000	678,000
Programs Under Development			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	0	0	0
Salton Sea Restoration Transfer	210,000	210,000	0
Subtotal of Proposed Programs	460,000	460,000	0
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	1,124,000	1,124,000	643,000
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	100,000	100,000	100,000
Coachella & All-American Canals Lining	93,700	93,700	93,700
Maximum CRA Supply Capability	1,317,700	1,317,700	836,700
Maximum Expected CRA Deliveries	1,250,000	1,250,000	836,700

FINAL DRAFT

Colorado River Aqueduct
 Program Capabilities
 Year 2020
 (acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	19,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	699,000	699,000	677,000
Programs Under Development			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	150,000	150,000	0
Salton Sea Restoration Transfer	0	0	0
Subtotal of Proposed Programs	400,000	400,000	0
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	1,064,000	1,064,000	642,000
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	192,500	192,500	192,500
Coachella & All-American Canals Lining	93,700	93,700	93,700
Maximum CRA Supply Capability	1,350,200	1,350,200	928,200
Maximum Expected CRA Deliveries	1,250,000	1,250,000	928,200

FINAL DRAFT

Colorado River Aqueduct
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	19,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	699,000	699,000	677,000
Programs Under Development			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	150,000	150,000	0
Salton Sea Restoration Transfer	0	0	0
Subtotal of Proposed Programs	400,000	400,000	0
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	1,064,000	1,064,000	642,000
Additional Non-Metropolitan CRA Supplies			
SDCW/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canals Lining	93,700	93,700	93,700
Maximum CRA Supply Capability	1,357,700	1,357,700	935,700
Maximum Expected CRA Deliveries	1,250,000	1,250,000	935,700

FINAL DRAFT

Colorado River Aqueduct
 Program Capabilities
 Year 2030
 (acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs:			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	19,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	699,000	699,000	677,000
Programs Under Development:			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	150,000	150,000	0
Saltion Sea Restoration Transfer	0	0	0
Subtotal of Proposed Programs	400,000	400,000	0
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	1,064,000	1,064,000	642,000
Additional Non-Metropolitan CRA Supplies:			
SDCWAIID Transfer	200,000	200,000	200,000
Coachella & All-American Canals Lining	93,700	93,700	93,700
Maximum CRA Supply Capability	1,357,700	1,357,700	935,700
Maximum Expected CRA Deliveries	1,250,000	1,250,000	935,700

Multiple Dry-year Supply Capability¹ & Projected Demands (Repeat of 1990-92 Hydrology) (acre-feet per year)					
	2010	2015	2020	2025	2030
Current Supplies					
Colorado River Aqueduct ²	722,000	699,000	699,000	699,000	699,000
California Aqueduct ³	911,600	911,600	911,600	911,600	911,600
In-Basin Storage	481,500	480,200	462,800	449,000	449,000
Supplies Under Development					
Colorado River Aqueduct	95,000	460,000	400,000	400,000	400,000
California Aqueduct	330,000	214,500	269,500	269,500	269,500
In-Basin Storage	78,000	103,000	103,000	103,000	103,000
Transfers to Other Agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
Metropolitan Supply Capability					
	2,618,100	2,833,300	2,810,900	2,797,100	2,797,100
Metropolitan Supply Capability w/CRA Maximum of 1.25 MAF⁴					
	2,618,100	2,765,600	2,710,700	2,689,400	2,689,400
Firm Demands on Metropolitan^{5,6}					
	2,410,000	2,431,000	2,459,000	2,596,000	2,729,000
Potential Reserve & Replenishment Supplies					
	208,100	334,600	251,700	93,400	-39,600

¹ Represents supply capability for resource programs under listed year type.

² Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct

³ California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct

⁴ Maximum CRA deliveries limited to 1.25 MAF including SDCWA/ID Transfer supplies and Coachella and All-American Canals lining supplies.

⁵ Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation and local supplies, SDCWA/ID Transfer supplies and Coachella and All-American Canals lining supplies.

⁶ Includes projected firm sales plus 70% of projected IAWP agricultural sales

Single Dry-year Supply Capability¹ & Projected Demands

(Repeat of 1977 Hydrology)
(acre-feet per year)

	2010	2015	2020	2025	2030
Current Supplies					
Colorado River Aqueduct ²	722,000	699,000	699,000	699,000	699,000
California Aqueduct ³	777,000	777,000	777,000	777,000	777,000
In-Basin Storage	840,000	837,800	807,900	784,300	784,300
Supplies Under Development					
Colorado River Aqueduct	95,000	460,000	400,000	400,000	400,000
California Aqueduct	330,000	214,500	269,500	269,500	269,500
In-Basin Storage	78,000	103,000	103,000	103,000	103,000
Transfers to Other Agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
Metropolitan Supply Capability					
	2,842,000	3,056,300	3,021,400	2,997,800	2,997,800
Metropolitan Supply Capability w/CRA Maximum of 1.25 MAF⁴	2,842,000	2,988,600	2,921,200	2,890,100	2,890,100
Firm Demands on Metropolitan^{5,6}	2,326,000	2,342,000	2,377,000	2,504,000	2,631,000
Potential Reserve & Replenishment Supplies	516,000	646,600	544,200	386,100	259,100

¹ Represents supply capability for resource programs under listed year type.

² Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct

³ California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct

⁴ Maximum CRA deliveries limited to 1.25 MAF including SDCWA/ID Transfer supplies and Coachella and All-American Canals lining supplies.

⁵ Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation and local supplies, SDCWA/ID Transfer supplies and Coachella and All-American Canals lining supplies.

⁶ Includes projected firm sales plus 70% of projected IAWP agricultural sales

Average Supply Capability¹ & Projected Demands (Average of 1922 - 2004 Hydrologies) (acre-feet per year)					
	2010	2015	2020	2025	2030
Current Supplies					
Colorado River Aqueduct ²	711,000	678,000	677,000	677,000	677,000
California Aqueduct ³	1,772,000	1,772,000	1,772,000	1,772,000	1,772,000
In-Basin Storage	0	0	0	0	0
Supplies Under Development					
Colorado River Aqueduct	0	0	0	0	0
California Aqueduct	185,000	185,000	240,000	240,000	240,000
In-Basin Storage	0	0	0	0	0
Transfers to Other Agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
Metropolitan Supply Capability	2,668,000	2,600,000	2,654,000	2,654,000	2,654,000
Metropolitan Supply Capability w/CRA Maximum of 1.25 MAF⁴	2,668,000	2,600,000	2,654,000	2,654,000	2,654,000
Firm Demands on Metropolitan^{5,6}	2,073,000	2,095,000	2,131,000	2,258,000	2,390,000
Potential Reserve & Replenishment Supplies	595,000	505,000	523,000	396,000	264,000

¹ Represents supply capability for resource programs under listed year type.

² Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct

³ California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct

⁴ Maximum CRA deliveries limited to 1.25 MAF including SDCWA/ID Transfer supplies and Coachella and All-American Canals lining supplies.

⁵ Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation and local supplies, SDCWA/ID Transfer supplies and Coachella and All-American Canals lining supplies.

⁶ Includes projected firm sales plus 70% of projected IAWP agricultural sales

Metropolitan Water District of Southern California

Average Year

Demographics (1)	2005	2010	2015	2020	2025	2030
Population	18,233,700	19,138,000	19,914,600	20,664,600	21,367,500	22,053,200
Occupied Housing Units	5,803,800	6,145,200	6,444,600	6,751,100	7,075,600	7,376,400
Single Family	3,477,300	3,651,000	3,767,600	3,945,800	4,128,700	4,250,100
Multi-Family	2,326,500	2,494,200	2,677,000	2,805,300	2,946,800	3,126,300
Persons Per Household	3.08	3.05	3.03	3.01	2.97	2.94
Urban Employment	8,186,200	8,991,300	9,402,700	9,795,200	10,163,000	10,537,600

Conservation	2005	2010	2015	2020	2025	2030
Total Conservation	735,900	865,200	955,200	1,027,600	1,106,900	1,188,300
Installed Active Devices Through 2004	91,200	85,800	63,200	23,000	900	100
IRP Conservation Target (2)	6,100	27,100	38,300	45,700	30,500	23,800
Code-Based and Price-Effect Savings (3)	388,600	502,300	603,700	708,900	825,500	914,400
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000	250,000

Total Demands After Conservation	2005	2010	2015	2020	2025	2030
Total Demands	4,303,900	4,647,500	4,764,200	4,927,200	5,068,100	5,190,400
Retail Agricultural	347,800	318,800	285,000	250,500	215,000	194,600
Retail Municipal and Industrial	3,768,000	4,053,400	4,196,900	4,392,100	4,569,600	4,719,400
Groundwater Replenishment	140,100	200,400	212,800	215,100	214,000	206,900
Seawater Barrier	48,000	74,900	69,500	69,500	69,500	69,500

Local Supplies	2005	2010	2015	2020	2025	2030
Total Local Supplies	2,107,600	2,377,400	2,465,900	2,593,300	2,613,500	2,612,100
Groundwater	1,341,500	1,416,000	1,429,800	1,431,000	1,443,500	1,442,300
Surface Water	59,400	100,000	99,500	99,200	99,200	98,600
Los Angeles Aqueduct	373,300	252,500	253,000	252,900	253,200	253,600
IRP Local Resource Program Target	0	12,800	33,000	38,300	37,500	37,500
Groundwater Recovery	60,500	81,700	82,100	85,300	85,300	85,300
Total Recycling	221,000	328,800	350,900	376,400	377,200	377,200
M&I and Agricultural	152,300	180,900	204,000	229,500	230,300	230,300
Groundwater Replenishment	52,000	90,000	90,000	90,000	90,000	90,000
Sea Water Barrier	16,800	57,900	56,900	56,900	56,900	56,900
Other Imported Supplies	51,900	185,600	217,600	310,100	317,600	317,600

Demands on Metropolitan	2005	2010	2015	2020	2025	2030
Total Metropolitan Demands	2,196,100	2,270,100	2,298,300	2,334,000	2,454,500	2,578,300
Full Service (Tier I and Tier II)	1,918,900	2,007,000	2,039,100	2,085,400	2,225,400	2,364,800
Replenishment Water Rate (4)	167,500	169,200	179,700	182,800	183,100	176,800
Interim Agricultural Water Program	109,700	93,900	79,500	65,800	46,000	36,700

Firm Demands on Metropolitan (5)	2005	2010	2015	2020	2025	2030
	1,996,000	2,073,000	2,095,000	2,131,000	2,258,000	2,390,000

Notes:

All units are acre-feet unless specified, rounded to the nearest hundred

Totals may not sum due to rounding

(1) Growth Projections: SCAG 2004 Regional Transportation Plan; SANDAG 2030 Forecast

(2) The 2030 savings target is derived from the 2003 IRP Update forecast projections for 2030; it is not an official target for 2030

(3) Measured from 1990; Includes plumbing codes for pre-rinse spray heads and high efficiency washing machines

(4) Replenishment Water Rate demands include: seasonal shift, groundwater spreading, and groundwater in-lieu

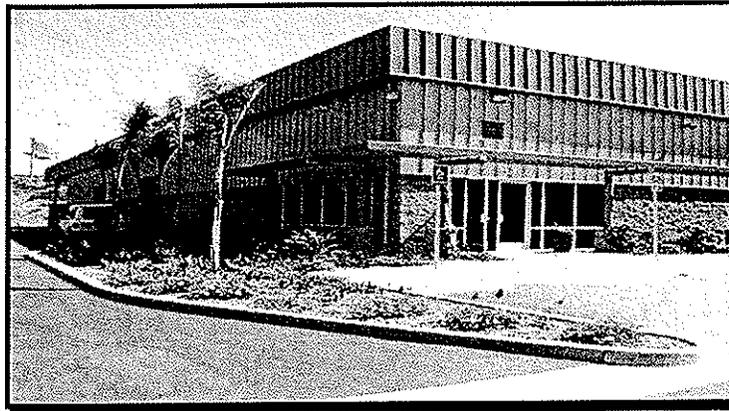
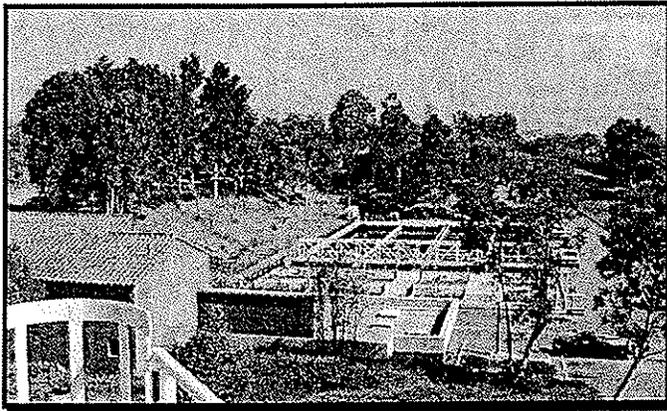
(5) Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands



Sweetwater Authority

2005 Urban Water Management Plan

December 2005



Prepared by
Sweetwater Authority Staff

December 2005

*2005 Urban Water Management Plan
Adopted by the Sweetwater Authority Governing Board
November 23, 2005*



Sweetwater Authority
505 Garrett Avenue
Chula Vista, CA 91910
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Sweetwater Authority
2005 Urban Water Management Plan
December 2005

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Appendix D	Best Management Practice Reports
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1 Introduction

Sweetwater Authority (Sweetwater) prepares an Urban Water Management Plan (UWMP) every five years in accordance with Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Chapter 1009, and became effective on January 1, 1984. The Act, which was Assembly Bill (AB) 797, requires that every urban water supplier providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 acre-feet of water annually, shall prepare and adopt a UWMP, in accordance with the prescribed requirements.

The Act requires urban water suppliers to file plans with the California Department of Water Resources (DWR) describing and evaluating reasonable and practical efficient water uses, reclamation, and conservation activities. As required by law, Sweetwater's UWMP includes projected water supplies required to meet future demands. Sweetwater prepared UWMPs in 1985, 1990, 1995, and 2000, and filed those plans with the DWR.

The California Urban Water Management Planning Act is included in Appendix A.

1.1 Sweetwater's 2005 Urban Water Management Plan

Sweetwater's 2005 UWMP was prepared by the staff of Sweetwater and constitutes the 2005 update to Sweetwater's 2000 UWMP. At the time of the writing of this Plan, the City of Chula Vista was preparing an update to their 1989 General Plan; however, this document was not finalized. The draft Plan identifies a significant redevelopment within the Chula Vista portion of Sweetwater's service area. Additionally, the City of National City has recently finalized a specific plan for redevelopment of its downtown area. These planning efforts are currently not reflected in future population projections developed by the San Diego Association of Governments (SANDAG). Therefore, Sweetwater adjusted the SANDAG population projections to account for this potential future development and the potential water demands generated.

Prior to adoption of the 2005 UWMP, Sweetwater mailed the Plan to the municipalities within the service area and made the Plan available for public review. Section 10642 of the Act requires that the urban water supplier shall make the Plan available for public hearing. The public hearing would include comments from the general public as well as comments from the local governmental agencies. A public hearing, conducted by Sweetwater, was held on November 23, 2005, at 505 Garrett Avenue, Chula Vista, CA, for the purpose of obtaining public comment and input on the draft Plan. There was no public comment at the hearing. This final report was adopted by Sweetwater's Board of Directors after the public hearing by Resolution 05-18, which is included as Appendix B. The Plan is available for public review at Sweetwater's Administration Office in Chula Vista.

DWR has prepared a "Review for Completeness" checklist for use by DWR staff in their review of 2005 UWMPs. To assist DWR in their review of Sweetwater's 2005 UWMP, this checklist has been filled out and is included as Appendix C.

1.1.1 Agency Coordination

While preparing the 2005 UWMP, Sweetwater coordinated its effort with a number of agencies and municipalities to ensure that the Plan accurately reflects the future planning for Sweetwater's service area. In coordination with DWR, the Metropolitan Water District of Southern California (Metropolitan), the San Diego County Water Authority (Water Authority), and Sweetwater attended a number of workshop sessions to discuss the requirements of the Act and to coordinate the regional UWMP planning efforts of Metropolitan, the Water Authority, and Water Authority member agencies. Sweetwater participated in the development, reviewed, and provided comments to

the Water Authority on its draft 2005 UWMP. The agencies and municipalities in which Sweetwater coordinated its Plan development is shown in Table 1.

Table 1 - Agency Coordination

Agency/Municipality	Coordinated Development	Contacted for Information	Sent Notice of Preparation	Sent Copy of Draft	Sent Notice of Intent to Adopt
Metropolitan	✓				
Water Authority	✓			✓	
City of Chula Vista		✓	✓	✓	✓
City of National City		✓	✓	✓	✓
San Diego County		✓	✓	✓	✓
Unified Port of San Diego		✓			

1.2 About Sweetwater

Sweetwater operates with a goal to diversify its supplies to maximize reliability and minimize cost to consumers. Sweetwater accomplishes this goal by maximizing its use of local resources to the greatest extent feasible, and through continuous and aggressive conservation programs. Examples of how Sweetwater accomplishes this goal include use of local potable groundwater supply, continuing pursuit to increase brackish groundwater production, continued operation of two local surface water sources, construction, and operation of its Urban Runoff Diversion System to protect surface water quality in the reservoir, implementation of upgrades to its treatment plant to meet future water quality regulations, investigations into the feasibility of using recycled water within its service area, and by participating in regional conservation programs.

1.2.1 History

Sweetwater was formed by the condemnation of a private water company that served the City of National City, City of Chula Vista, and a portion of the County of San Diego. The condemnation suit was filed by the South Bay Irrigation District (SBID) and the City of National City on May 10, 1968, and was finalized on August 30, 1977. SBID and the City of National City formed Sweetwater by the Joint Powers Agreement of February 1, 1972. The Agreement was amended and re-adopted on July 22, 1977. Sweetwater was formed pursuant to the provisions of Article 1, Chapter 5, Division 7, Title 1 of the Government Code of the State of California. Sweetwater is empowered by the Joint Powers Agreement to acquire, own, lease, operate, manage, maintain, and improve the water system.

SBID was formed during March 1951, under the Irrigation Law of California (Division 11, Section 20500 of the Water Code), and includes most of the western portion of the City of Chula Vista, and the unincorporated area within and adjacent to the Sweetwater River Valley. It also overlaps small segments of the City of National City and the City of San Diego. On May 1, 1990, SBID transferred ownership of the water system, including all of the property deeds and easements to Sweetwater. The City of National City is part of the urbanized South Bay region of the San Diego metropolitan area located on San Diego Bay. Incorporated in 1887, National City is the second oldest city in San Diego County. SBID and the City of National City are members of the Water Authority.

The mission of Sweetwater is to provide its current and future customers with a safe, reliable, and affordable water supply through the use of the best available technology, sound management practices, public participation, and a balanced approach to human and environmental needs.

1.2.2 Service Area

Sweetwater's water system provides water service to a population of approximately 179,485 within the City of National City, a portion of the City of San Diego, and the South Bay Irrigation District, which consists of a portion of the City of Chula Vista, and the unincorporated portion of the County of San Diego known as Bonita. The Sweetwater service area covers 36.5 square miles and contains approximately 33,180 service connections. At the present time, there are no plans for expansion of the Sweetwater service area. Sweetwater's service area is shown on Figure 1.

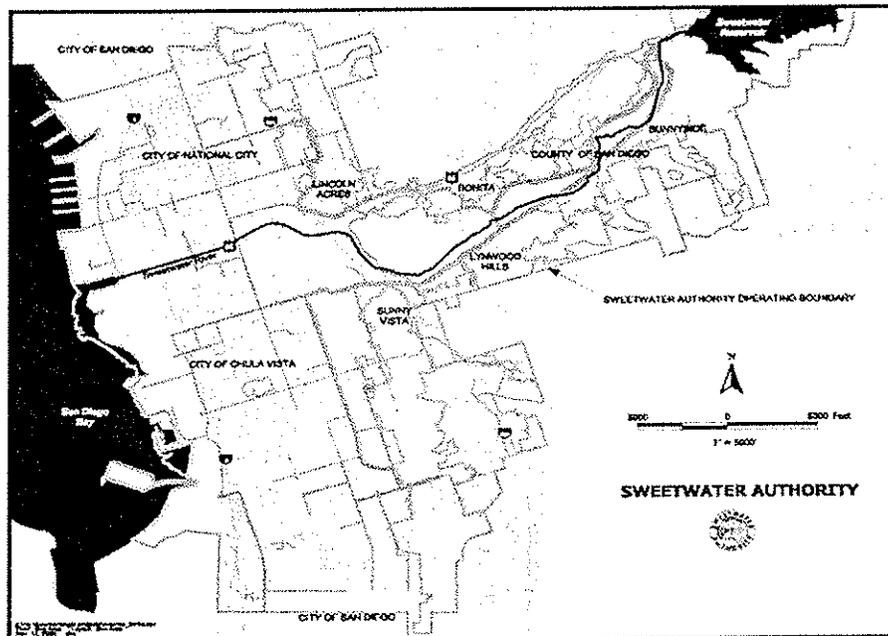


Figure 1 – Sweetwater's Service Area

1.2.3 Conveyance Treatment and Distribution Facilities

Sweetwater obtains its water from four sources: imported treated and untreated water from the Water Authority; surface runoff from the Sweetwater River watershed, which is fully appropriated to Sweetwater; the National City well field, and a brackish groundwater desalination facility. In addition, the system has emergency water connections to three other water agencies including Otay Water District, the City of San Diego, and the California American Water Company.

Sweetwater owns and operates two storage reservoirs known as Sweetwater Reservoir and Loveland Reservoir. Sweetwater was constructed in 1888 and Loveland in 1945. Sweetwater and Loveland Reservoirs have an approximate capacity of 28,079 acre-feet and 25,387 acre-feet, respectively. The watershed for the Sweetwater River is approximately 186 square miles. Sweetwater Reservoir is approximately 17 miles downstream of Loveland Reservoir.

Sweetwater operates the Robert A. Perdue Water Treatment Plant (Perdue Plant) located adjacent to the Sweetwater Reservoir. The Perdue Plant has a treatment capacity of 30 million gallons per day (MGD) and is capable of treating surface runoff stored at Sweetwater Reservoir or imported raw water from the Water Authority. The plant currently includes four filters, chemical storage and feed equipment, and pretreatment facilities, including flocculation and sedimentation basins. However, upgrades to the plant are currently being designed, which include the replacement of the filters with submersible membranes and upgrades to the plant's SCADA system, chemical feed facilities and raw water pump station, and the installation of a hydroturbine for onsite power generation. A 10 million-gallon reservoir at the site serves as clearwell storage for the plant and as the point of delivery into the distribution system.

Sweetwater operates the National City Wells, which produce potable groundwater (Total Dissolved Solids [TDS] approximately 600 milligrams per liter [mg/l]) and the Richard A. Reynolds Groundwater Desalination Facility (Desalination Facility) that produces drinking water from brackish groundwater (TDS between 2,000 and 2,500 mg/l). Both well fields pump from the San Diego Formation.

The National City Wells consist of three wells: Nos. 2, 3, and 4. Well Nos. 3 and 4 operate, while Well No. 2, which is the oldest well, serves as a backup. Sweetwater has produced an average of 1,770 acre-feet per year from the National City Wells from 1954 to 2004.

The Desalination Facility commenced operation in January 2000. The facility was designed to take groundwater from four alluvial wells and five deep San Diego Formation wells, located on the north side of the Sweetwater River. A sixth San Diego Formation well is currently being constructed, and a seventh well is currently in design. The facility removes the TDS from the brackish groundwater using reverse osmosis technology (R/O). The Desalination Facility was initially designed to produce four MGD of drinking water; however, it was constructed with space to accommodate an expansion to produce up to eight MGD.

Sweetwater has 20 storage tanks that represent approximately 43,514,000 gallons of treated water throughout its system, including a major buried reservoir with a capacity of 18 million gallons. The system has 23 pumping stations, with a total pumping capacity of approximately 36,000 gallons per minute (GPM) from all distribution pumping sources. Pipeline sizes range from 2-inch to 48-inch and extend approximately 390 miles.

1.3 Sweetwater's Service Area Characteristics

1.3.1 Climate

Climate conditions within the service area are characteristically Mediterranean along the coast, with mild temperatures year-round. The majority of the service area is within two miles of the San Diego Bay. However, the Bonita area and the reservoirs are located farther inland, and experience slightly hotter summers and colder winters. More than 80% of the region's rainfall occurs from December through March. Average annual rainfall is approximately 11.3 inches per year at the Sweetwater Reservoir based on records dating back to 1888. Climate data for Sweetwater Reservoir is included in Table 2, which consists of the 117-year average monthly rainfall, and average monthly high temperature based on records dating back to 1961. Average monthly evapotranspiration (ET_o) data was obtained from the California Irrigation Management Information System (CIMIS) website for the Otay Lakes Station. Sweetwater's 30-year rainfall totals are shown on Figure 2 and average monthly climate data is shown on Figure 3.

Table 2 - Climate Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Ave precip (in.)	2.15	2.12	1.99	0.87	0.35	0.08	0.04	0.07	0.20	0.55	1.06	1.83
Ave temp (°F)	68.7	69.1	69.1	71.8	72.9	76.2	81.4	84.1	82.8	79.0	73.6	68.9
ETo	0.98	1.43	2.44	3.31	4.03	4.49	4.64	4.03	3.31	2.44	1.18	0.61

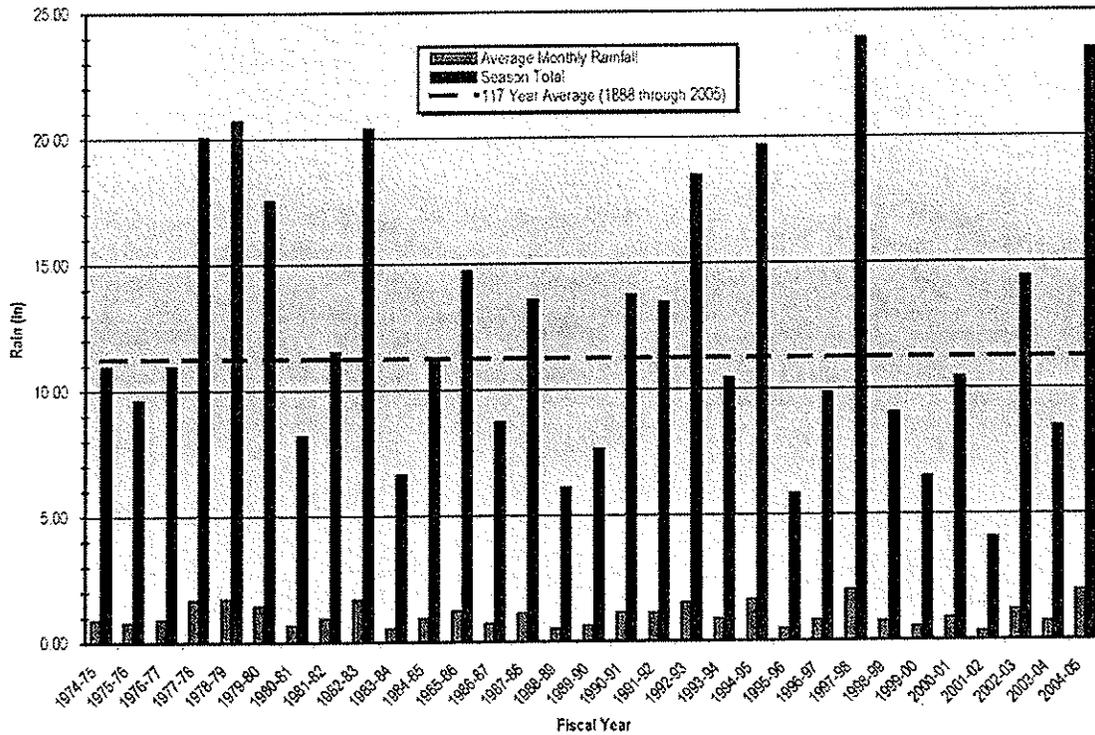


Figure 2 – Sweetwater Reservoir 30-Year Precipitation

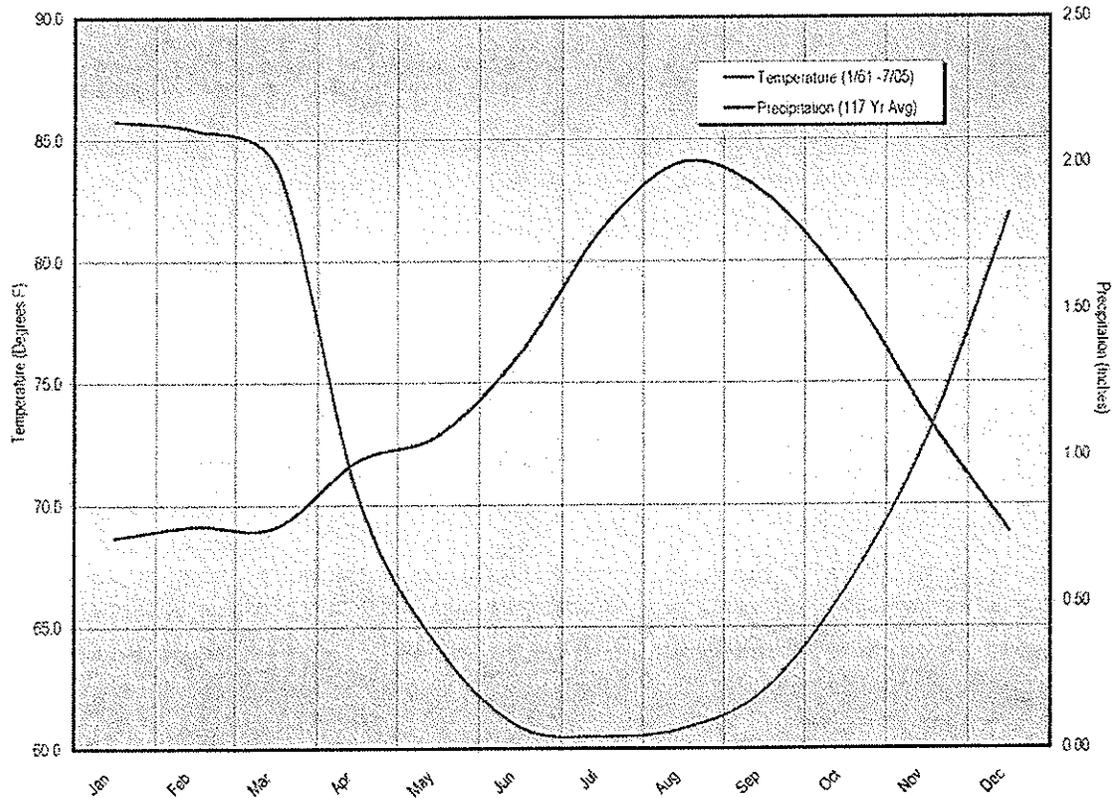


Figure 3 – Sweetwater's Average Climate

1.3.2 Population

Population growth data for Sweetwater was obtained from SANDAG's 2030 Regional Growth Forecast, as provided to Sweetwater by the Water Authority. See Table 3.

At the time of the writing of this UWMP, the City of Chula Vista was preparing an update to their 1989 General Plan called Chula Vista Vision 2020; however, this document was not finalized. The draft Plan identifies a significant redevelopment within the Chula Vista portion of Sweetwater's service area, including residential densification and significant commercial and retail redevelopment. Additionally, the City of National City has plans for redevelopment not reflected in their current General Plan.

During the preparation of this UWMP, Sweetwater verified with SANDAG that the 2030 Regional Growth Forecast is based upon approved General Plans and does not include redevelopment identified in the current draft and recently finalized planning documents. Therefore, Sweetwater has taken the approach to prepare this UWMP to adjust SANDAG's population projections to account for this future development and the water demands it will generate.

Table 3 - Population Projections

	2005	2010	2015	2020	2025	2030
SANDAG 2030 Population Projection	179,485	180,906	185,447	190,387	192,660	198,752
Redevelopment Increase	---	4,958	14,688	23,715	27,760	38,158
Revised Population Projection	179,485	185,864	200,135	214,102	220,420	236,730

1.3.3 Demographics

The projected water use in Sweetwater's service area was generated by incorporating the projection of long-term demographics (population, housing, and employment) from the adopted regional growth management plans provided by SANDAG, and information provided by the Cities of Chula Vista and National City. In addition to accounting for future demographic trends, Sweetwater's water use forecasts also incorporate current and future conservation efforts.

Due to conservation measures, demands within Sweetwater's service area have decreased over the past 20 years. Several changes in demographics will tend to increase water use in the future. Development of the Chula Vista Bayfront, redevelopment, including densification and mixed-use development in the Chula Vista and National City downtown areas, will significantly increase the residential population in areas that are now predominantly commercial and retail in nature. However, as new buildings replace existing buildings, water efficiency standards for toilets, showerheads, faucets, and urinals will cause the per capita water usage to decrease.

2 Water Demands

2.1 Historic Water Demands

Sweetwater categorizes water demands by residential, commercial, industrial, public, irrigation, and other uses. Residential includes domestic and irrigation use for single- and multi-family homes as well as mobile homes. Commercial use includes retail and other businesses, restaurants, and golf courses. Industrial use generally includes manufacturing. Public use includes all governmental agencies, including the United States Navy and civic use such as schools, libraries, and park irrigation. Other use includes construction meters. The largest employers in the Sweetwater service area include B.F. Goodrich, Duke Energy, the United States Navy, Western Salt Company, Chula Vista Marina, and the Port of San Diego. Table 4 shows the historical water demands and number of accounts by use sector between years 1995 and 2005. Figure 4 illustrates the water breakdown for fiscal year 2004-2005.

Table 4 – Historic and Current Water Demands by Sector (1995 through 2005)

Fiscal Year ¹		Residential ²	Commercial ³	Industrial	Public Authority	Irrigation	Other ⁴	Total
1995	No. Meters	29,730	3,306	51	491	7	22	33,607
	Usage (acft)	14,979	3,873	402	1,363	31	21	20,668
1996	No. Meters	29,626	3,365	46	498	12	21	33,568
	Usage (acft)	15,903	3,996	393	1,565	31	31	21,917
1997	No. Meters	29,641	3,366	46	496	10	19	33,578
	Usage (acft)	16,062	4,011	433	1,780	37	18	22,341
1998	No. Meters	29,636	3,359	46	508	10	23	33,582
	Usage (acft)	15,519	4,278	439	1,366	34	18	21,653
1999	No. Meters	29,630	3,393	47	509	11	27	33,617
	Usage (acft)	16,166	4,118	393	1,409	34	21	22,141
2000	No. Meters	29,648	3,396	47	513	11	26	33,641
	Usage (acft)	16,885	4,321	408	1,743	43	18	23,418
2001	No. Meters	29,664	3,409	47	532	11	30	33,693
	Usage (acft)	16,346	4,328	442	1,964	46	20	23,147
2002	No. Meters	29,715	3,383	46	536	11	36	33,727
	Usage (acft)	16,748	4,290	419	1,825	53	29	23,364
2003	No. Meters	29,809	3,412	47	544	9	35	33,856
	Usage (acft)	16,413	4,350	367	2,360	48	27	23,565
2004	No. Meters	29,918	3,415	46	563	9	38	33,989
	Usage (acft)	16,784	4,549	408	2,110	51	39	23,942
2005	No. Meters	29,384	3,173	41	536	8	38	33,180
	Usage (acft)	16,094	4,407	405	1,897	31	42	22,878

1. Fiscal Year July 1 through June 30.
2. Residential includes domestic and irrigation for single-family, multi-family, and mobile homes.
3. Commercial includes domestic and irrigation for businesses and golf courses.
4. "Other" includes construction meters.

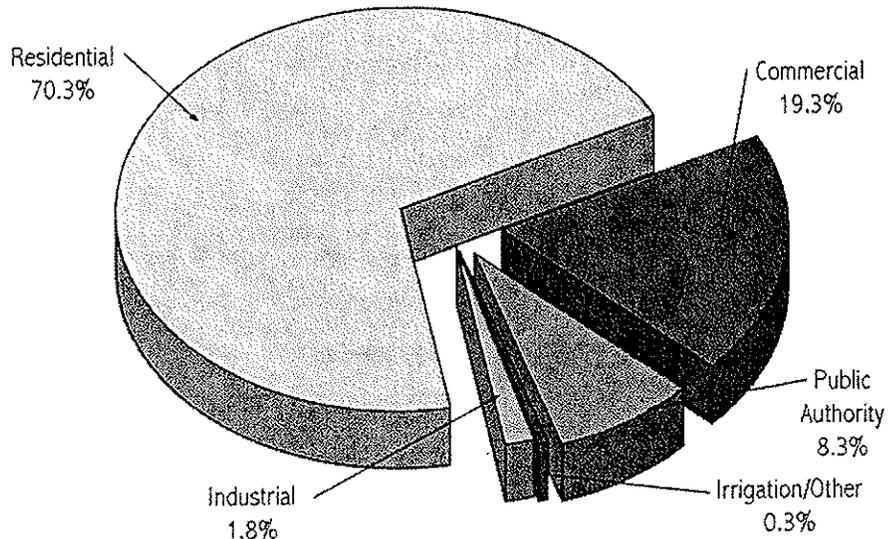


Figure 4 -2005 Water Use by Sector

2.2 Projected Normal Year Water Demands

Sweetwater's demand projections are shown in Table 5. As previously stated, to fully quantify probable demands, Sweetwater has included in its projections those demands that would be generated through future redevelopment and residential densification of Sweetwater service area. The projects that Sweetwater has included in its demand projections that are not reflected in the SANDAG population projections include:

- City of Chula Vista - Urban Core Specific Plan
- Unified Port of San Diego - Chula Vista Bayfront Master Plan
- Other redevelopment associated with Chula Vista Vision 2020 General Plan (draft)
- City of National City Downtown Specific Plan

Sweetwater, under Senate Bill 610, has recently prepared Water Supply Assessments for the City of Chula Vista Urban Core Specific Plan and the Unified Port of San Diego Chula Vista Bayfront Master Plan.

Table 5 - Projected Normal Year Water Demands

Water Use Sector	Fiscal Year Ending				
	2010	2015	2020	2025	2030
Residential	17,126	18,211	19,362	19,878	21,205
Commercial	4,583	4,691	4,805	4,856	4,987
Industrial	456	607	768	840	1,025
Public Authority	2,130	2,192	2,258	2,287	2,364
Irrigation/Agricultural	49	44	39	36	30
Other	39	40	41	41	42
Unaccounted for Water	1,041	1,101	1,165	1,193	1,266
Estimated Conservation Savings	1,212	1,590	1,952	2,320	2,659
Total	24,213	25,296	26,485	26,813	28,260

2.3 Dry Year Demand Assessment

The dry year demand assessment is shown in Tables 6.1 through 6.5, and includes demands during single and multiple dry water years. Studies have shown that hot, dry weather may generate urban water demands that are approximately 7%* greater than normal demands. These percentages were utilized to generate the dry year demands shown in Tables 6.1 through 6.5. No extraordinary conservation measures beyond BMP implementation are reflected in the demand projections.

*Source: *Weather-Related Water Demand Variability in Metropolitan Water District Service Area, 9/1990*

Table 6.1- Projected Water Demand during Single and Multiple Dry-Year Periods (2006 through 2008)

	Normal Water Year (2005)	Single Dry Water Year (2005)	Multiple Dry Water Years		
			Year 1 (2006)	Year 2 (2007)	Year 3 (2008)
Total Demand (acre-feet)	23,570	25,220	25,357	25,495	25,632

Table 6.2- Projected Water Demand during Single and Multiple Dry-Year Periods (2011 through 2013)

	Normal Water Year (2010)	Single Dry Water Year (2010)	Multiple Dry Water Years		
			Year 1 (2011)	Year 2 (2012)	Year 3 (2013)
Total Demand (acre-feet)	24,213	25,907	26,139	26,371	26,603

Table 6.3- Projected Water Demand during Single and Multiple Dry-Year Periods (2016 through 2018)

	Normal Water Year (2015)	Single Dry Water Year (2015)	Multiple Dry Water Years		
			Year 1 (2016)	Year 2 (2017)	Year 3 (2018)
Total Demand (acre-feet)	25,296	27,067	27,321	27,576	27,830

Table 6.4- Projected Water Demand during Single and Multiple Dry-Year Periods (2021 through 2023)

	Normal Water Year (2020)	Single Dry Water Year (2020)	Multiple Dry Water Years		
			Year 1 (2021)	Year 2 (2022)	Year 3 (2023)
Total Demand (acre-feet)	26,485	28,339	28,409	28,480	28,550

Table 6.5- Projected Water Demand during Single and Multiple Dry-Year Periods (2026 through 2028)

	Normal Water Year (2025)	Single Dry Water Year (2025)	Multiple Dry Water Years		
			Year 1 (2026)	Year 2 (2027)	Year 3 (2028)
Total Demand (acre-feet)	26,813	28,690	28,999	29,309	29,619

3 Demand Management Measures

3.1 Description

Sweetwater recognizes water conservation and demand management as a priority in its water use planning. The long-term goal of Sweetwater's water conservation program is to achieve and maintain water use limits for various use categories that are reasonable for that category. Specific objectives of Sweetwater's conservation program are to:

- Eliminate wasteful practices in water use
- Continue to develop information on both current and potential water conservation practices
- Ongoing, timely implementation of conservation practices
- Public information and education activities to spread knowledge of water use techniques

Sweetwater started a water conservation program in 1990. Initial efforts included a long-term public information program and cooperation with the conservation efforts of the Water Authority. The water conservation program expanded significantly during the 1987-1992 drought, and the backbone of a long-term conservation program was formed. Since that time, Sweetwater has continued to revamp the conservation program by developing a variety of innovative and effective approaches to demand management.

Water conservation programs are developed and implemented on the premise that water conservation increases water supply by reducing the demand of available supply, which is vital to the optimal use of the region's supply resources. Sweetwater actively participates in countywide and regional conservation programs through the Water Authority and Metropolitan. As a member of the Water Authority, Sweetwater benefits from regional programs performed on behalf of its member agencies. Sweetwater also participates in many water conservation programs designed and typically operated on a shared-cost participation program basis among the Water Authority, Metropolitan, and their member agencies.

The vast majority of water savings result from the residential and commercial Ultra Low Flow Toilets (ULFT) and High Efficiency Washers (HEW) programs. Sweetwater is gradually shifting emphasis toward more water efficient landscaping and commercial appliances, as these programs continue to evolve. Opportunities for ULFT savings will decline and landscape water efficiency will be increasingly emphasized and practiced. The resulting savings in supply, directly relates to additional available water in the San Diego region for beneficial use within the Water Authority service area, including Sweetwater. In partnership with the Water Authority, the County of San Diego, and developers, Sweetwater's water conservation efforts are expected to grow and expand.

Sweetwater's fiscal year 2005 budget includes \$78,900 for conservation programs that are anticipated to save approximately 2,400 acre-feet for the year. This financial commitment represents an average cost of approximately \$33 per acre-foot of projected water sales during fiscal year 2005. Conservation programs also reduce imported water demand.

3.2 Best Management Practices

Demonstrating its commitment to conservation, Sweetwater officials became an original signatory to the *Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California*, which created the

California Urban Water Conservation Council (CUWCC) in 1991 in an effort to reduce California's long-term water demands. As defined in the MOU, water conservation Best Management Practices (BMP) is a "generally accepted practice among water suppliers that results in more efficient use or conservation of water." Since becoming a signatory in 1991, Sweetwater has made implementation of the BMPs for water conservation the cornerstone of its conservation programs, and a key element in its water resource management strategy. Sweetwater's BMP Implementation Status Reports, BMP Water Savings Reports, and BMP Coverage Reports, which are considered 100% complete by the CUWCC, are included in Appendix D.

The BMP programs implemented by Sweetwater include the following:

- **BMP 1 - Water Survey Programs for Single-Family and Multi-Family Residential Consumers** - The Residential Survey Program is free to both single- and multi-family residential consumers, and has been available since 1995. The program helps consumers learn how to save water in their own homes, which in turn saves the consumers money. The survey includes a review of landscaping, outdoor irrigation system, indoor use, identification of indoor leaks, a complete educational packet, information about other water conservation programs, free faucet aerators and low-flow showerheads. An irrigation surveyor will perform a meter leak detection test, check the irrigation system, suggest seasonal adjustments for a consumer's individual water schedule, check the soil to ensure that watering coincides with moisture absorption, discuss proper lawn maintenance, and offer low water use landscape information.
- **BMP 2 - Residential Plumbing Retrofit** – Retrofit water conservation device packages, which include toilet tank displacement devices and shower head flow restrictors, were made available to essentially all households within Sweetwater's service area in 1977, as part of a DWR pilot water conservation study. Sweetwater offered retrofit devices, which include low-flow showerheads, toilet tank displacement kits, and faucet aerators to its consumers from 1991 through 2003. To present, Sweetwater has distributed 20,833 low-flow showerheads, and continues to offer incentive vouchers for installing water efficient toilets, washers, and other appliances.

The Water Authority and its member agencies distributed over 550,000 showerheads between 1991 and 2002. Since January 1, 1994, showerheads manufactured in the United States must be in compliance with 2.5 GPM maximum flow. Data gathered from the Residential Survey Program (BMP 1) showed 80-90% saturation of low-flow showerheads in homes surveyed.

- **BMP 3 - System Water Audits, Leak Detection, and Repair** – Many of Sweetwater's system water audits, leak detection, and repair programs contribute to better water management and reduction in water loss.

Water Audits. Sweetwater conducts a monthly audit of its overall system for unbilled and unaccounted for water loss. Using these comparisons, Sweetwater can evaluate the need for implementation of a formal water loss reduction program.

Unbilled water loss represents the difference between water sales and water production. Sweetwater's 12-month average unbilled water loss was 5.6% in 2003 and 5.2% in 2004.

Unaccounted for water loss is determined by comparing total water use (water sales, meter inaccuracy due to aging, main breaks, major fire fighting use, system flushing, etc.) with total water production. Sweetwater's 12-month average unaccounted for water loss was 2.76% in 2003 and 1.51% in 2004.

Leak Detection. A Supervisory Control and Data Acquisition (SCADA) system was installed in the distribution system in 2001, and is used to monitor water flow throughout the system. Rapid changes in water quantity and/or pressure at any of the monitoring points within the system are immediately evaluated. On the rare occasion a leak is discovered, it is quickly detected and corrected. A leak detection survey was performed on 19.49 miles of the distribution system in September 2002. Total annual water loss for surveyed portions of the system was calculated at 0.0 gallons.

Water System Improvements. Routine and preventative maintenance is performed on the distribution system. In addition, Sweetwater implements a capital improvement program to maintain and renew transmission, distribution, and storage facilities.

Facility Inspection. Critical facilities, including pump stations and valve vaults are inspected bi-weekly. Other distribution facilities are inspected weekly. As part of Sweetwater's preventative maintenance program, each system valve is exercised at least every three years, and each fire hydrant is visually inspected and maintained every one to two years.

Meter Maintenance and Replacement Program. A 15-year repair/replacement program covers every service meter within the Sweetwater system. Meters sized $\frac{5}{8}$ -inch are calibrated and replaced as needed. Meters sized 1- $\frac{1}{2}$ to 2-inches are calibrated and rebuilt as necessary. Meters sized 3-inches and larger are calibrated and maintained annually.

Water Theft. Sweetwater monitors incidents of water theft, and has the ability to charge up to three times the water service rate when it is determined that water theft has occurred.

- **BMP 4 - Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections –** Sweetwater requires the installation of water meters on all services throughout its distribution system, and bills by volume of water metered.
- **BMP 5 – Large Landscape Conservation Programs and Incentives -** From 1991 to 2004, large landscape (defined as landscape with one acre or more) irrigation surveys were available to consumers at no charge through the *Professional Assistance for Landscape Management (PALM)* program, sponsored by the Water Authority. Using methodology developed by the Irrigation Training and Research Center at California Polytechnic State University at San Luis Obispo, the surveyor performs catch can tests, makes numerous soil and plant observations, and calculates ETo based irrigation schedules.

Beginning in 2005, residential and commercial consumers with large landscapes (currently defined as over 2,000 square feet) can receive the following services at no charge through the *Smart Landscape* program, sponsored by Sweetwater, the Water Authority, Metropolitan, and DWR:

Landscape irrigation audits. Audits are available at no charge to residential and commercial consumers with a minimum of 2,000 square feet of irrigated landscaping. Site audits include a review of irrigation conditions, watering schedule, and sprinkler distribution uniformity, by a trained technician. Landscape area measurement and water use recommendations are provided.

Weather-Based Irrigation Controllers. Vouchers are available to residential and commercial consumers with a minimum of 2,000 square feet of irrigated landscaping for weather-based irrigation controllers to retrofit old timers. Residential (\$65) and commercial (\$13.33 per active station) vouchers are available.

Irrigation System Upgrade Grants. Grants up to \$2,500 in matching funds are available through the *Commercial Landscape Incentive Program*. Sites must have a minimum of one acre of irrigated landscape, and be currently over-irrigated to qualify.

Water Budgets. A voluntary program for consumers with dedicated irrigation meters is being developed by the Water Authority for member agencies. Water use data is converted into web-accessible water budgets. Each billing cycle, participating consumer water use is charted against previous use and calculated landscape water needs. Water budgets help consumers determine the right amount of water required to maintain healthy landscaped areas, given weather conditions. Water budgets can decrease outside water use by 20 percent.

- **BMP 6 – High-Efficiency Washing Machine Voucher Program** - Since 2000, Sweetwater has participated in the Water Authority's voucher program. New technology in washing machine design provides for more efficient water use and savings. Residential consumers have taken advantage of the \$100 to \$125 voucher offers to replace their standard top-loading washers with a low-water use, energy-efficient model. Prior to March 10, 2004, high-efficiency washers had water efficiency factor values of 9.5 or less. With greater availability of ultra-high efficiency washers, vouchers are now limited to machines with water efficiency factor values of 6.0 or less. The water efficiency factor is determined by the amount of water it takes to wash a cubic foot of laundry. The lower the water efficiency factor, the greater the water efficiency of the clothes washer.
- **BMP 7 – Public Information Programs** - Sweetwater promotes water conservation in coordination with the Water Authority and Metropolitan. Regional activities include: public service announcements, demonstration gardens, monthly conservation strategy meetings, water awareness month activities, water efficiency workshops and landscape water use classes. Sweetwater independently distributes public information through its website, bill inserts, on-hold telephone messages, annual Consumer Confidence Report, newsletters, news releases, brochures, keynote speakers, classroom presentations, facility tours, video library, and participation in year-round special events and community festivals.

Literature-Brochures. Sweetwater provides brochures and literature on a variety of water conservation topics including lawn watering, Xeriscape planting, drip irrigation, swimming pool maintenance, leak detection and general household conservation tips. These are made available to residents through a literature rack at Sweetwater's Administration Office and website, through individual and group mailings, through distribution to residential complex managers, and through distribution at public appearances by Sweetwater Board members and staff. Sweetwater Customer Service Representatives also distribute Conservation Policy Brochures to new and other water consumers, while out in the field. The brochures contain leak detection information and water-saving tips.

Films. Sweetwater has distributed "Water Wise Gardening," a film on Xeriscape plants and efficient irrigation, to all public libraries in its service area. In addition, this film is available to rent from

Sweetwater's film library. The library also includes informational films produced by Sweetwater, which promote conservation, as a source for future water needs.

Newsletters/Brochures. Sweetwater publishes a quarterly consumer newsletter, "Customer Connections," incorporating conservation tips and programs. Brochures are developed and distributed to deal with specific conservation issues, as was the case for all stages of the water alert in 1990 and 1991. To communicate the conservation measures called for by the alert in 1990 and 1991, Sweetwater developed brochures in English and Spanish, and distributed 35,000 of the brochures through bulk mail, with a special mailing and accompanying letter of instruction for residential complex managers.

Personal Letters. Sweetwater sends a personalized letter to notify consumers of reported or observed water waste on their property. These letters are sent to elicit cooperation in Sweetwater's efforts to use water wisely, and are sent with appropriate conservation materials, such as a lawn watering guide, leak detection information, or general conservation tips.

Seminars. Sweetwater works with local agencies to cooperatively host periodic conservation seminars for groups of water users, targeted toward high water use consumers, or toward specific types of use. These seminars include information on current water saving methods and devices, and contacts for additional assistance and information, as well as a summary of local agency information and contact persons for cooperative efforts between Sweetwater and its consumers.

Speakers Bureau. Sweetwater staff and Board of Directors are available to address civic and community groups, clubs, associations and other organizations on a wide variety of water issues. Speakers provide conservation handouts to interested audience members at these appearances. The Sweetwater speakers bureau is promoted through involvement in civic groups, through the customer newsletter, through letters to local libraries and schools, and through periodic newspaper announcements of availability.

Committees. Sweetwater maintains a permanent Communications Committee to provide assistance and suggestions to staff regarding water awareness issues. This committee can be convened as needed to provide assistance and suggestions to staff regarding conservation issues and address customer concerns resulting from water reduction allocations.

Exhibits and Related Materials. Sweetwater participates in local business and community fairs to distribute water-saving devices, conservation literature, and to answer consumer questions face-to-face. Materials have also been provided to local merchants and libraries for their distribution and displays on general water conservation issues. Sweetwater also partners with neighboring water agencies to put on water conservation public awareness events, including water-wise technology expos and landscape contests.

Tours. Sweetwater provides tours of its Perdue Plant in Spring Valley and its Desalination Facility in Chula Vista. Bus fees are reimbursed for any tour provided to elementary and secondary school students within the service area. Tours are also provided for college and military students, community groups, after school programs, and student enrichment clubs (i.e. scouting, boys and girls clubs). Leadership tours of facilities are offered up to 10 times per year to local business leaders, elected

officials, and representatives from high-use water consumers. Lessons and information presented during the tours incorporate information about the limited water supply for the region and wise water use practices.

News Relations: Sweetwater provides formal press releases and feature story information to the Chula Vista Star News, the San Diego Union Tribune, and local radio and television reporters, as well as to trade and special interest publications. In response to local community interest, Sweetwater established a regular watering index in the Star News during the 1990-91 water alert.

Advertising. Sweetwater has purchased advertising or content space in local newspapers, school and city newsletters, and chamber publications to promote water conservation and understanding of water issues. Additional advertising has been provided in the Star News through a co-sponsorship of a Sweetwater water conservation poster contest.

- **BMP 8 – School Education Programs** – Sweetwater has had an active school education program, which includes water conservation messages since 1991. In 2000, Sweetwater created a regular education specialist position to support the school education program, in addition to other activities. Sweetwater’s Education Specialist provides instructional assistance, educational materials, and classroom lessons that identify urban, agricultural, and environmental issues and conditions in the local watershed.

Sweetwater also participates in the Water Authority’s countywide education programs. The Water Authority offers students from kindergarten through high school a wide array of educational opportunities including water testing kits, and computer programs.

Elementary School Education Program. A professional teacher provides classroom lessons in elementary schools throughout the service area, teaching students about the water cycle and watershed protection. Each of these lessons includes discussion of wise water use practices.

Sweetwater has provided copies of water conservation films and books to each elementary school library in the service area. Water conservation games, books, and posters have been distributed to each classroom, and Sweetwater has provided each elementary student with promotional gifts reinforcing water conservation during various water awareness month campaigns.

Sweetwater provides web-based learning for elementary students at its website. Its teachers also prepare and present specialized lessons for science fairs, extended day programs, and classrooms upon request, and promote the use of Water Authority and Metropolitan education programs.

Junior and Senior High School Education Programs. Sweetwater’s professional teachers have developed secondary-school classroom lessons on water treatment, groundwater, and water supply issues, all with a discussion of wise water use practices. Laboratory equipment issued by the Water Authority is provided to secondary school teachers for classroom use. Sweetwater staff promotes use of Metropolitan and Water Authority secondary school education programs on conservation gardening, water quality, water sources, and the effects of the political process on water supplies. Sweetwater has been an active partner in programs geared toward local secondary school students, including a program to encourage student activities to benefit the Sweetwater River Watershed coordinated by the Resource Conservation District of Greater San Diego. Staff, from throughout Sweetwater, has

participated in career-based events with the local schools, and were featured in "Water Works," a curriculum unit developed by the Water Authority and Metropolitan. Sweetwater has provided a variety of water resources for use at local schools, including water maps and issues guides, distributed to social science and science teachers, and "The Cadillac Desert," an eight-hour video series produced by public television, distributed to secondary school and public libraries in the service area.

Mini-Grant Program for Local Schools. Sweetwater provides mini-grants to teachers for the development and presentation of water-based lessons, to assist with providing conservation demonstration gardens at local school sites, and to host use of the Water Authority's Splash Science Lab at local schools.

- **BMP 9 – Conservation Programs for Commercial, Industrial, and Institutional Accounts –** Sweetwater participates in the Water Authority's Commercial, Industrial & Institutional Program (CII), which offers point-of-purchase vouchers to customers for water-efficient devices. Vouchers are available for commercial Ultra Low-Flush Toilets (\$95), for low-flow and waterless urinals (\$95), for single-load commercial clothes washers installed in laundromats, and multi-family common areas (\$150), for multi-load commercial clothes washers (\$775), for cooling tower conductivity controllers (\$500), and for hospital X-ray processor water conservation units (\$3,247). The vouchers reduce the up-front costs for businesses, and the equipment produces long-term savings in water, sewer, and energy costs. Incentives are also available for spray valves used for pre rinsing dishes in commercial kitchens (free installation).
- **BMP 10 – Wholesale Agency Assistance Program -** This BMP applies only to wholesale agencies. The Water Authority provides conservation-related technical support and information to its member agencies, and typically manages the programs on behalf of its member agencies. Sweetwater, the Water Authority, and Metropolitan share funding for most conservation incentives. Typically, Sweetwater and the Water Authority each contribute one-quarter of the cost, and Metropolitan provides one-half of the incentive.
- **BMP 11- Conservation Pricing –** Sweetwater's water rate structure is set up as an increasing block rate, which increases the cost of water in seven steps for residential use. This encourages residential users to limit their water use by charging more for units above a base amount. The increasing rate structure was implemented with a higher rate starting at the 90th percentile of the average consumer use, to encourage average consumers to cut their use by 10% to avoid the higher rate. All other water users such as commercial, industrial, public, and agricultural are billed at a single uniform rate structure. This rate is higher than the base block rates for residential customers, in order to encourage large users to control excess use of water. Sweetwater currently offers a financial incentive (\$.61 per unit) for single-family residential customers who use less than 10 units per billing cycle.
- **BMP 12 – Water Conservation Coordinator –** Sweetwater first designated a Conservation Coordinator in 1991. During this same year, Sweetwater used three temporary staff positions to handle the increased volume of conservation-related activities caused by the drought. In June 1992, a Water Conservation – Information Specialist staff position was created.

Sweetwater currently has a program coordinator and assistant who oversee the water conservation program, along with employee training and professional development programs.

- **BMP 13 – Water Waste Prohibition** – The following water waste prohibitions are designed to encourage efficient water use within the region, and provide a method for meeting demand reduction goals, should an extended water shortage occur.

Region. The County of San Diego enforces several state and local ordinances requiring water conservation to assure available water resources are put to beneficial use for all citizens of the county. California Plumbing Code, Section 402, requires the installation of water conserving fixtures in new construction. Section 67.101 of the County's Code of Regulatory Ordinances simply prohibits water waste: "No person shall waste or cause or permit to be wasted any water furnished or delivered by any agency distributing for public benefit any water dedicated to or provided for public use within the unincorporated territory of the County of San Diego."

In addition, cities and counties are required to enforce California's Model Water Efficient Landscape Ordinance as it applies to new and rehabilitated public and private landscapes that require a permit and on developer installed residential landscapes (Section 6717c.1 of the County's Zoning Ordinance). The County's Water Conservation and Landscape Design Manual implements Zoning Ordinance Section 6712 (d), which requires efficient irrigation uses (including rain sensors), transitional zones, use of native plantings, restriction on turf, use of mulch, the preservation of existing vegetation and natural features, and the use of reclaimed water when available.

Agency. With Resolution 92-7 passed on March 25, 1992, Sweetwater established rules and requirements for water conservation. This resolution prohibits wasteful use of water and is in effect until more stringent measures are required.

For use during emergency conditions such as drought or catastrophic interruption in service where additional water use restrictions are necessary, Sweetwater has developed a six-stage drought response plan allowing for water use cutbacks of 10-40% and more, and has established an allocation method of rationing water during drought stages. Although Resolution 92-1, which describes Sweetwater's allocation program is not currently in effect, the program could be instituted on short notice if required.

Stage 1 – Demand reduction goal 0% – no shortage. Encourages measures to use water wisely.

Stage 2 – Designed to reduce water use by up to 10 percent. Calls for voluntary compliance with measures.

Stage 3, 4, 5 and 6 – Designed to reduce water use by 15, 20, 30, and 40 percent, respectively. Calls for mandatory compliance with measures to reduce water use. In addition to surcharges for use above predetermined allotment, imposes penalties for non-compliance. These stages are used when the water supply may not meet demand, due to drought or other prolonged shortage circumstance.

According to Resolution 93-2, "When the amount of water supply available to Sweetwater Authority for service to customers falls below the Stage 2 triggering levels," the General Manager has the authority to declare that a shortage emergency condition exists and implement Sweetwater's Water Shortage Contingency Plan.

- **BMP 14 – Residential ULFT Replacement Program** – Since 1991, Sweetwater has participated in the Water Authority’s Residential Ultra Low Flush Toilet (ULFT) voucher (previously “rebate”) program. This program offers point-of-purchase vouchers (\$75) to residential consumers to be used towards the purchase of water efficient devices to replace older, less efficient units.

Since 1992, toilets manufactured in the United States must comply with a 1.6 gallons per flush (gpf) maximum flow. Toilets with consistently lower water use continue to be developed. Beginning in 2005, ULFT vouchers are only available for toilets on the Supplemental Purchase Specifications (SPS) list to encourage customers to install toilets that have met more rigorous water efficiency standards. Vouchers (\$95) are also available for dual flush toilets.

3.3 Best Management Practices Not Fully Implemented

As defined in the MOU, a water conservation BMP is a “generally accepted practice among water suppliers that results in more efficient use or conservation of water.” As more and better data is collected over time, the BMPs are refined and revised based upon the most objective criteria available. The MOU sets agency-specific implementation schedules and coverage goals based on standardized criteria, including signatory date and base year data. The MOU recognizes specific BMP goals that may be delayed or remain unmet due to varying local conditions and provides for good faith efforts towards implementation.

Sweetwater is making the following good faith efforts:

- **BMP 1 - Water Survey Programs for Single-Family and Multi-Family Residential Customers** – Sweetwater’s customer service staff perform high bill investigations each billing cycle on all accounts to assist consumers in identifying leaks on their premises.

Plumbing code changes and improvements in the efficiency of water fixtures have significantly reduced the water savings potential from performing indoor residential water surveys. The CUWCC is scheduled to discontinue BMP 1 in 2007. It is anticipated that a new BMP 15 incorporating outdoor water survey elements from BMP 1 will be adopted by the CUWCC prior to 2008. Upon adoption, Sweetwater will develop an implementation schedule for BMP 15.

- **BMP 5 – Large Landscape Conservation Programs and Incentives** - Sweetwater has historically given first consideration for water conservation program resources to retrofit and replacement programs (ULFT, showerhead, and HEW vouchers) which have demonstrated long-term water savings with minimal effort and action required on the part of the consumer to maintain savings.

Sweetwater is gradually shifting emphasis towards more water efficient landscape customer support programs as the technologies to support water efficient landscaping continue to evolve. The Water Authority is developing a web-based water budget program for its member agencies. In 2006, Sweetwater will begin to offer water budgets to customers with dedicated irrigation meters.

- **BMP 13 – Water Waste Prohibition** – One condition of BMP 13 requires enforceable measures to prohibit single-pass cooling systems in new connections and non-recirculating systems in all new conveyer car wash businesses, commercial laundry systems, and non-recycling decorative water fountains. These measures have not been specifically addressed in regional, local, and agency policies; however, water waste ordinances and regulations have been enacted for general water waste and for areas not specifically

addressed by BMP 13. An evaluation of the impacts of additional water waste prohibitions and legal authority for implementation of these measures is planned in 2006.

3.4 Future Water Conservation Savings

Projected water savings and effectiveness of conservation measures provided in the 2005 UWMP are based on industry standard methodologies for calculating savings, as defined by the CUWCC. Projections show that implementing existing and proposed urban BMPs would produce water savings of approximately 2,658.9 acre-feet per year by the year 2030 within Sweetwater's service area. This target coincides with the availability of anticipated funds from Metropolitan, the Water Authority, and grant funding. Table 7 represents a projection of the additional water that will be conserved based on the best information available at this time.

Table 7 – Potential Additional Water Conservation Savings

Best Management Practices	2010 (AF)	2015 (AF)	2020 (AF)	2025 (AF)	2030 (AF)
Existing BMPs					
Residential Surveys	0	0	0	0	0
Residential Retrofits	0	0	0	0	0
Landscape	722.2	851	979.7	1108.5	1237.2
Clothes Washer Incentives	14.3	23.2	23.2	23.2	23.2
Commercial/Industrial Inst.	143.2	303.1	463.7	622.9	782.7
ULFT Incentives	270.1	270.1	270.1	270.1	270.1
Subtotal	1149.8	1447.4	1736.7	2024.7	2313.2
Potential BMPs and Efficiency Standards					
Efficiency Standards	61.2	141.5	214	293.9	344.3
Greywater	0.7	0.9	0.5	0.6	1
On Demand Water Heaters	0.1	0.3	0.3	0.3	0.4
Subtotal	62	142.7	214.8	294.8	345.7
Total	1211.8	1590.1	1951.5	2319.5	2658.9

Future water conservation savings are based on historical activity for incentive programs Sweetwater has offered to consumers. No additional savings from residential surveys and residential retrofits is anticipated after 2005. Plumbing code changes and improvements in the efficiency of water fixtures have significantly reduced the water savings potential for these activities.

Because outdoor irrigation represents the single largest area of water use, the savings potential from outdoor watering is significant. Landscape savings are based on full implementation of BMP 5, through water budgets, large landscape audits, and irrigation hardware replacement. Additional landscape water savings can potentially be achieved through incentives, regulations, and rates.

Beginning in 2007, washing machines offered for sale in the United States must comply with new state-required efficiency standards. Therefore, additional water savings from offering clothes washer incentives for high-

efficiency washing machines is expected to level off by 2015. Water savings after 2010 for washing machines represents residual savings during the expected lifetime of previously installed devices.

Water savings in the Commercial, Industrial, and Institutional (CII) sector are based on both historical activity and anticipated new water-efficient products that will experience expanded use. These products include multi-load commercial HEWs, food steamers, commercial dishwashers, and waterless urinals. Future water savings, which may result from CII products and processes installed by customers without Sweetwater's financial assistance, have not been included in savings forecasts.

The ULFT incentive program Sweetwater offers in partnership with the Authority is tentatively scheduled to end in 2007. Therefore, additional water savings from offering ULFT incentives is expected to level off by 2010. ULFT water savings after 2010 represents residual savings during the expected lifetime of previously installed devices.

BMPs lacking industry standard methodologies for calculating savings and those that do not directly result in water savings are not included in Table 7. For example, through public information programs, a water user may learn about the availability of a HEW voucher, however water will not be saved until the new HEW is installed and operated.

Sweetwater will continue to cooperate with the CUWCC, Metropolitan, and the Authority to identify future opportunities for water conservation savings. Potential BMPs represent areas of study where appropriate, demonstration projects are being carried out to determine if the practices meet the criteria to be designated by the CUWCC as BMPs. Studies for greywater and hot-water-on-demand systems are proceeding within California, and the outcome of those studies will help determine appropriate programs for encouraging the use of these systems in new homes.

Efficiency standards include water-savings devices installed in new residential construction as part of the state-required codes, as well as toilets replaced through natural replacement outside of the toilet incentive program.

4 Sweetwater's Supplies

Water used in Sweetwater's service area comes from various sources. These sources include local groundwater, a brackish groundwater desalination facility, surface water and imported water from the Colorado River, and the State Water Project. The imported water is delivered by the Water Authority, which is either purchased from, or wheeled by Metropolitan, and is then purchased by Sweetwater. As shown in Figure 5, since 1955, local sources have met 44.7% of the water needs within Sweetwater's service area while the 55.3% balance has been met with imported water. The percentage of local to imported water varies greatly with time due to local rainfall amounts.

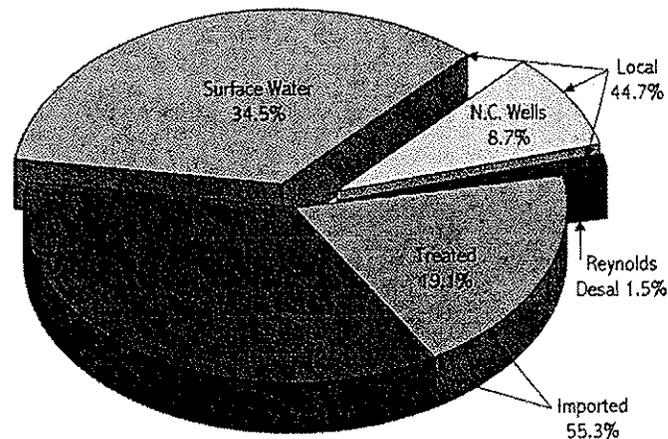


Figure 5 - Historic Source of Supply (1955 through 2005)

4.1 Local Supply

Sweetwater obtains its local supply from three sources: surface runoff from the Sweetwater River watershed, which is fully appropriated to Sweetwater; the National City well field, and a brackish groundwater desalination facility. Sweetwater's historic and projected normal year's local supplies are shown in Table 8. Normal year surface supply projections are based on the 50th percentile of runoff within the Sweetwater River Watershed, excluding that runoff spilled from the Sweetwater Dam to San Diego Bay. Projected normal year groundwater supplies are limited by pumping and treatment capacity.

Table 8- Historic and Projected Normal Water Year Sweetwater Local Supplies

Fiscal Year Ending	Total Local Supply (acre-feet)	Local Supply (acre-feet)		
		Reservoirs	National City Wells	Reynolds Desal. Facility
1980	18,700	17,392	1,308	---
1985	21,271	20,052	1,219	---
1990	1853	---	1,853	---
1995	17,247	15,855	1,392	---
2000	20,319	16,302	1,899	2,118
2005	12,228	8,449	1,793	1,986
2010	12,200	5,400	2,400	4,400
2015	12,200	5,400	2,400	4,400
2020	12,200	5,400	2,400	4,400
2025	12,200	5,400	2,400	4,400
2030	12,200	5,400	2,400	4,400

4.1.1 Surface Water Sources

Sweetwater owns and operates two storage reservoirs known as Sweetwater Reservoir and Loveland Reservoir. Sweetwater Reservoir was constructed in 1888 and Loveland Reservoir in 1945. Sweetwater and Loveland Reservoirs have an approximate capacity of 28,079 acre-feet and 25,387 acre-feet, respectively. The watershed for the Sweetwater River is approximately 186 square miles. Sweetwater Reservoir is downstream of Loveland Reservoir and has a treatment plant capable of producing 30 MGD. Local supply from Sweetwater Reservoir varies from zero to 100% depending on the local runoff conditions.

During wet years when Sweetwater and Loveland Reservoirs are at or near full capacity, they are capable of providing up to a two-year supply to Sweetwater consumers. As part of Metropolitan's Seasonal Storage Operators Agreement (SSOA) program, Sweetwater has the ability to purchase water from the Water Authority in the winter and store it in Sweetwater Reservoir for use in the summer. Storing water in the winter for summer use is a regional benefit due to the fact that more water becomes available for other local water agencies in the summer.

4.1.2 Groundwater Sources

Sweetwater produces groundwater from the Sweetwater Valley Groundwater Basin identified in State of California Department of Water Resources (DWR) Bulletin 118 as Basin Number 9-17. Sweetwater adopted an interim groundwater management plan that governs groundwater management until a subsequent groundwater management plan can be prepared in accordance with Water Code Section 10750 (AB3030). The interim groundwater management plan is included as Appendix E.

The Sweetwater Valley Groundwater Basin underlies an alluvial valley that empties into the San Diego Bay and is bounded on the east by the impermeable Santiago Peak volcanic rocks. The north and south are Pliocene and Pleistocene semi-permeable terrestrial deposits, which constitute valley walls. The western boundary is San Diego Bay. Basin recharge is derived from seasonal runoff from precipitation, discharge from the Sweetwater and Loveland Reservoirs, and underflow from the reservoirs.

Two water-bearing formations in the basin are the Quaternary Alluvium and the San Diego Formation. In 1997, the Water Authority estimated a groundwater storage capacity of 13,000 acre-feet in the Quaternary Alluvium and about 960,000 acre-feet in the San Diego Formation. The Sweetwater Valley Groundwater Basin is not an adjudicated basin; therefore there has never been any restriction on the rate of extraction since groundwater production began. In addition, the Sweetwater Valley Groundwater Basin has not been identified in DWR Bulletin 118 as in overdraft.

Sweetwater operates the National City Wells, which produce potable groundwater (TDS approximately 600 mg/l) and the Desalination Facility that produces drinking water from brackish groundwater (TDS between 2,000 and 2,500 mg/l). Both well fields pump from the San Diego Formation.

The National City Wells consist of three wells: Nos. 2, 3 and 4. Well Nos. 3 and 4 operate while the oldest well, No. 2, serves as a backup. Sweetwater has produced an average of 1,770 acre-feet per year from the National City Wells from 1954 to 2004.

The Desalination Facility commenced operation in January 2000. The facility was designed to take groundwater from four alluvial wells and five deep San Diego Formation wells, located on the north side of the Sweetwater River. A sixth San Diego Formation well is currently being constructed and a seventh is in design. The facility removes the salt from the brackish groundwater using reverse osmosis technology. Currently, the alluvial wells are not operated for the following reasons: 1) summertime vegetative distress in the Sweetwater River, and 2) because of surface water influence on the relatively shallow alluvial formation, and the R/O membranes not being approved for surface water treatment. Groundwater production for the past five years is included in Table 9.

Table 9 - Groundwater Production 2000 through 2004

Fiscal Year Ending	Total Groundwater Produced (acre-feet)	Source (acre-feet)	
		NC Wells	Desalination Facility
2000	4,017	1,899	2,118
2001	4,890	1,775	3,115
2002	4,658	1,406	3,252
2003	4,447	1,637	2,840
2004	3,637	1,595	2,042

Phase I of the Desalination Facility was designed to produce four MGD of drinking water. The facility was constructed with space to accommodate a Phase 2 expansion to produce up to eight MGD. Well Nos. 6 and 7, when on line, will allow the Desalination Facility to produce up to 4,400 acre-feet per year. Additionally, Sweetwater is currently participating in studies with the United States Geologic Survey (USGS) to evaluate the San Diego Formation Aquifer and make safe use of the available yield from the aquifer.

4.1.3 Water Recycling

Sweetwater does not produce or distribute recycled water. Several potential changes in the service area could have significant impacts on the future potable water demands. These include:

- The construction of a new Duke Energy Power Plant. This would replace the existing South Bay Power Plant. The new plant could require up to 5 MGD of cooling water.

- The development of the Chula Vista Bayfront. This planned project will cover approximately 550 acres along San Diego Bay. The land uses being considered include parks and open space. This development will increase the demand for potable water.

Due to these developments, Sweetwater has prepared a master plan for the distribution of recycled water within its service area. Additionally, Sweetwater is participating in a study with the Water Authority to analyze potential water recycling plant locations within Sweetwater's service area.

Due to uncertainties surrounding these new developments, the implementation of recycled water service within Sweetwater's service area is unknown; therefore, the use of recycled water has not been considered in the preparation of this UWMP. However, this section provides a summary of the results of master planning effort and the plant siting study now underway.

4.1.3.1 Sweetwater's Recycled Water Master Plan

Sweetwater's Recycled Water Master Plan evaluated 8 recycled water system alternatives with demands ranging from 4,300 acre-feet per year to 5,470 acre-feet per year. Recycled water sources included both a new recycled water plant that would be constructed by Sweetwater and the City of Chula Vista, and a supply from the City of San Diego's South Bay Water Reclamation Facility. A preferred alternative was identified that included demands of 4,300 acre-feet per year and a supply from the South Bay Water Reclamation Facility. However, approximately 2,700 acre-feet per year is related to the development of a new water-cooled power plant. At this time, it is unclear if the power plant will be developed or if it will be air or water-cooled. Without the development of the water-cooled plant, it is likely that development of a recycled water system within Sweetwater's service area would be cost prohibitive.

4.1.3.2 Water Authority's Membrane Bioreactor Study

Sweetwater is participating in the Water Authority's Membrane Bioreactor Study. Recent technology advancements have made satellite treatment plants utilizing membrane bioreactor (MBR) technology a feasible cost effective alternative to traditional centralized wastewater treatment plants. The ability of MBR technology to comply with strict effluent requirements, operate reliably with minimal operator attendance, and occupy far less space than traditional systems, which allows it to be easily sited close to the recycled water consumers. The study includes evaluation of "scalping" plants taking raw sewage from the City of Chula Vista by intercepting existing regional sewer lines, treating it locally through a miniature version of a wastewater treatment plant and putting the residuals back in the sewer downstream of the withdrawal point.

Sweetwater submitted three sites for evaluation (overall eleven sites in the Water Authority's service area were evaluated). A preliminary evaluation and screening of the eleven sites was conducted resulting in three of the sites being further evaluated. The screening resulted in one site in Sweetwater's service area (at Main Street and Fourth Avenue in Chula Vista) being selected for further evaluation. At this location, an average sewage flow of approximately 10 MGD in 2010 and ultimately 14 MGD in 2030 has been identified. The recycled water output from the plant will be determined based on considerations related to maintaining enough sewage flow in the sewers to flush the solids to the regional wastewater treatment plant and recycled water end user demand.

4.2 Dry Year Local Supply Assessment

Probability estimates for usable runoff were calculated using the hydrologic data for the period between 1926 and 2004 within the Sweetwater River Watershed, excluding that runoff spilled from the Sweetwater Dam to San

Diego Bay. Based on this data, the historical amount of useable runoff for normal, single, and multiple dry years was determined. The normal water year for local runoff is based upon the 50th percentile of runoff, excluding that runoff spilled from Sweetwater Reservoir to San Diego Bay, the single dry year is the year with the lowest runoff (1961), and the multiple dry year period is the lowest average runoff for a consecutive three-year period (1959 through 1961). The National City Wells and the Desalination Facility are relatively fixed supplies that are not weather dependent; therefore, the production from these sources has not been reduced during a drought event. Table 10 shows the estimated supply from local sources.

Table 10 - Projected Local Supply during Single and Multiple Dry-Year Periods

Supply Source	Normal Water Year	Single Dry Water Year	Multiple Dry Year Period		
			Year 1	Year 2	Year 3
Sweetwater Reservoir	5,400	350	830	830	830
National City Wells	2,400	2,400	2,400	2,400	2,400
Reynolds Desalination	4,400	4,400	4,400	4,400	4,400
Total Local Supplies	12,200	7,150	7,630	7,630	7,630

4.3 Imported Supplies

Sweetwater represents two (City of National City and South Bay Irrigation District) of the 24 member agencies of the Water Authority. Member agency status entitles Sweetwater to directly purchase water from the Water Authority on a wholesale basis. One hundred percent of Sweetwater's imported water is purchased from the Water Authority. The Water Authority is a member agency of Metropolitan. The statutory relationships between the Water Authority and its member agencies, and Metropolitan and its member agencies, respectively, establish the scope of Sweetwater's entitlements to water from these two agencies. The quantities of water purchased from the Water Authority by Sweetwater are shown on Table 11.

The Water Authority was organized on June 9, 1944 under the County Water Authority Act for the sole purpose of importing Colorado River Water into San Diego County. The imported water, now a combination of Colorado River water and State Project water, is sold wholesale to the 24 member agencies of the Water Authority. The member agencies are autonomous and their City Councils or Board of Directors set local policies and pricing structures.

Imported water delivered by the Water Authority is either purchased from or wheeled by Metropolitan from Metropolitan facilities located just south of the San Diego County/Riverside County line. Metropolitan is a public agency organized in 1928 by a vote of the electorates of 13 Southern California cities. Since its formation, Metropolitan has grown to include 27 member agencies of which the Water Authority is the largest. Metropolitan was formed for the purpose of developing, storing, and distributing water to the residents of Southern California.

Table 11 – Historic Sweetwater Imported Supplies

Fiscal Year Ending	Total Imported Water (acre-feet)	Source (acre-feet)	
		Untreated	Treated
1985	4,634	---	4,634
1986	20,842	---	20,842
1987	16,384	---	16,384
1988	20,514	---	20,514
1989	19,519	---	19,519
1990	24,019	---	24,019
1991	20,508	---	20,508
1992	14,722	---	14,722
1993	6,188	---	6,188
1994	1,387	---	1,387
1995	5,045	---	5,045
1996	1,589	---	1,589
1997	14,230	---	14,230
1998	8,452	---	8,452
1999	---	---	---
2000	5,520	5,429	91
2001	14,381	14,381	
2002	18,858	18,858	
2003	19,752	19,752	
2004	19,648	19,648	
2005	11,342	11,234	108

4.4 Transfers and Exchanges

Sweetwater currently transfers and exchanges water on an emergency basis with three neighboring water districts. Sweetwater has three interconnections with the City of San Diego, which borders to the north and south; four interconnections with Otay Water District, which borders to the east and south; and one interconnection with California American Water Company, which borders to the south. At the present time, the agency interconnections are used for emergencies and planned shutdowns. The interconnections with California-American Water Company benefit both agencies, and the interconnections with the City of San Diego and Otay Water District only benefit Sweetwater due to hydraulic gradient differentials.

Also, when Sweetwater Reservoir is at full capacity and spilling, Sweetwater has in the past, sold excess water to California-American Water Company. In the winter of 1995 Sweetwater sold excess water to California-American Water Company for several months.

Sweetwater also participates in Metropolitan's SSOA Program that was initiated in November 2003. This program allows pre-delivery of imported water for storage in local reservoirs during off-peak (winter) season, typically when excess water is available. This water is then withdrawn for use during the peak (summer) season. Metropolitan provides an incentive to participate in the SSOA program by discounting the water by \$70 per acre-foot. Since the inception of the program, Sweetwater has taken delivery of 12,030 acre-feet in fiscal year 2003/2004, 8,219 acre-feet in fiscal year 2004/2005, and has been allotted 6,326 acre-feet for fiscal year 2005/2006. This program will expire in October 2008, unless renewed by Metropolitan.

5 Water Supply Reliability

The reliability assessment required by the UWMP Planning Act required urban water suppliers to compare the total projected water use with the expected supply over the 20-year planning period in five year increments. This reliability assessment is required for normal, single dry, and multiple dry-year periods.

5.1 Normal Year Assessment

Table 12 shows the forecasted normal year water demands compared with projected local supplies and the required imported supplies. This demonstrates that if imported supplies are available, as indicated in Metropolitan's and the Water Authority's planning documents, there will be adequate water supplies to serve the proposed Project along with existing and future uses.

Table 12 - Projected Water Supply and Demand during Normal Year for Period 2005 to 2025

Source	Supply (acre feet)					
	2005	2010	2015	2020	2025	2030
Sweetwater Reservoir	8,449	5,400	5,400	5,400	5,400	5,400
National City Wells	1,793	2,400	2,400	2,400	2,400	2,400
Reynolds Desalination	1,986	4,400	4,400	4,400	4,400	4,400
Available Local Supply	12,228	12,200	12,200	12,200	12,200	12,200
Imported Supplies	11,342	12,013	13,096	14,285	14,613	16,060
Total Projected Supplies	23,570	24,213	25,296	26,485	26,813	28,260
Total Projected Demand	23,570	24,213	25,296	26,485	26,813	28,260

5.2 Dry Year Assessment

The normal, single, and multiple dry-year scenarios are shown in Tables 13.1 through 13.5. If projected imported and local supplies are available, as indicated in Metropolitan's and the Water Authority's draft 2005 UWMPs, no shortages are anticipated within the Sweetwater's service area in the dry-year scenarios analyzed.

Table 13.1 - Projected Water Supply and Demand during Single and Multiple Dry-Year Periods (2006 through 2008)

Source	Normal Water Year (2005)	Single Dry Water Year (2005)	Multiple Dry-Year Period		
			2006	2007	2008
Sweetwater Reservoir	5,400	350	830	830	830
National City Wells	2,400	2,400	2,400	2,400	2,400
Reynolds Desalination	4,400	4,400	4,400	4,400	4,400
Total Local Supplies	12,200	7,150	7,630	7,630	7,630
Imported Supplies	11,342	21,091	17,727	17,865	18,002
Total Projected Supplies	23,570	25,220	25,357	25,495	25,632
Total Projected Demand	23,570	25,220	25,357	25,495	25,632

*Table 13.2 - Projected Water Supply and Demand during Single and Multiple Dry-Year Periods
(2011 through 2013)*

Source	Normal Water Year (2010)	Single Dry Water Year (2010)	Multiple Dry-Year Period		
			2011	2012	2013
Sweetwater Reservoir	5,400	350	830	830	830
National City Wells	2,400	2,400	2,400	2,400	2,400
Reynolds Desalination	4,400	4,400	4,400	4,400	4,400
Total Local Supplies	12,200	7,150	7,630	7,630	7,630
Imported Supplies	12,013	18,757	18,509	18,741	18,973
Total Projected Supplies	24,213	25,907	26,139	26,371	26,603
Total Projected Demand	24,213	25,907	26,139	26,371	26,603

*Table 13.3 - Projected Water Supply and Demand during Single and Multiple Dry-Year Periods
(2016 through 2018)*

Source	Normal Water Year (2015)	Single Dry Water Year (2015)	Multiple Dry-Year Period		
			2016	2017	2018
Sweetwater Reservoir	5,400	350	830	830	830
National City Wells	2,400	2,400	2,400	2,400	2,400
Reynolds Desalination	4,400	4,400	4,400	4,400	4,400
Total Local Supplies	12,200	7,150	7,630	7,630	7,630
Imported Supplies	13,096	19,917	19,691	19,946	20,200
Total Projected Supplies	25,296	27,067	27,321	27,576	27,830
Total Projected Demand	25,296	27,067	27,321	27,576	27,830

*Table 13.4 - Projected Water Supply and Demand during Single and Multiple Dry-Year Periods
(2021 through 2023)*

Source	Normal Water Year (2020)	Single Dry Water Year (2020)	Multiple Dry-Year Period		
			2021	2022	2023
Sweetwater Reservoir	5,400	350	830	830	830
National City Wells	2,400	2,400	2,400	2,400	2,400
Reynolds Desalination	4,400	4,400	4,400	4,400	4,400
Total Local Supplies	12,200	7,150	7,630	7,630	7,630
Imported Supplies	14,285	21,189	20,779	20,850	20,920
Total Projected Supplies	26,485	28,339	28,409	28,480	28,550
Total Projected Demand	26,485	28,339	28,409	28,480	28,550

*Table 13.5 - Projected Water Supply and Demand during Single and Multiple Dry-Year Periods
 (2026 through 2028)*

Source	Normal Water Year (2025)	Single Dry Water Year (2025)	Multiple Dry-Year Period		
			2026	2027	2028
Sweetwater Reservoir	5,400	350	830	830	830
National City Wells	2,400	2,400	2,400	2,400	2,400
Reynolds Desalination	4,400	4,400	4,400	4,400	4,400
Total Local Supplies	12,200	7,150	7,630	7,630	7,630
Imported Supplies	14,613	21,540	21,369	21,679	21,989
Total Projected Supplies	26,813	28,690	28,999	29,309	29,619
Total Projected Demand	26,813	28,690	28,999	29,309	29,619

6 Water Quality

Sweetwater supplies consist of local and imported surface waters treated at Sweetwater's Perdue Plant, brackish groundwater treated at the Desalination Facility, and potable groundwater from the National City Wells. This section evaluates water quality issues associated with Sweetwater's local supplies.

6.1 Surface Water

A large portion of the drinking water supplied to Sweetwater's customers comes from the Sweetwater Reservoir. The reservoir stores both local runoff from the 182 square-mile Sweetwater River Watershed, and imported raw water purchased from the Water Authority. Depending on rainfall, upward of 50 to 80% of the water impounded in the reservoir could be from the imported supply.

The makeup of the imported supply includes water from the California State Project (SPW) and the Colorado River (CRW). In the near future, as part of the Water Authority's Emergency Storage Program (ESP), the imported water may also include water from other local reservoirs. Threats to the imported supply include increasing salinity and total organic carbon levels in SPW, and the use of reclaimed water in ESP storage reservoirs. Any changes or degradation of water quality in the imported supply will lead to increased treatment and potential capital improvement costs. More information on imported supply water quality can be found in Metropolitan's and the Water Authority's UWMPs.

The watershed for the Sweetwater River, which supplies local runoff into the Sweetwater Reservoir, is divided into three basins. The lower basin is below the reservoir and drains into San Diego Bay. In the middle basin, continued urbanization over the next 20 years will negatively impact the quality of runoff into the reservoir. However, low quality runoff into the Sweetwater Reservoir can be diverted around the reservoir by the Sweetwater Authority's Urban Runoff Diversion System (URDS). The URDS system includes a series of ponds and conveyances designed to capture dry weather flows, the first flush from early seasonal storms, or hazardous spills in the watershed, and divert the flows around the reservoir. Accidental sewage or hazardous spills can be contained in the ponds until they can be properly dealt with. The upper basin, which flows into the Loveland Reservoir, is largely undeveloped, and therefore, runoff is generally of better quality. Sweetwater's staff continually monitors development projects within the watershed and requires that developers include measures in their plans to mitigate any negative impact to the reservoirs. In addition, Sweetwater has completed a sanitary watershed assessment as required by the Department of Health Services.

Sweetwater also has a reservoir brush removal program. This program is necessary because of the terrain characteristics. Sweetwater Reservoir produces a large amount of vegetation growth as the lake levels fluctuate. The brush reduces water quality by increasing precursors to trihalomethane formation.

Based on the above, Sweetwater does not anticipate threats to the quality of either the imported or local supplies that are likely to lead to discontinued use. Any significant degradation of the quality of either supply, however, could lead to significant capital expenditures in order to ensure continued compliance with drinking water regulations.

6.2 Groundwater

Three potable groundwater wells at the National City Wells supply up to 2.0 million gallons per day to Sweetwater's service area. The wells are located in a fairly urbanized area with several potential contaminating

activities nearby. Although screened at levels low enough that the threat of contamination from surface activity should be considered remote, degradation of the groundwater supply by surface contamination could lead to costly treatment or possible discontinued use of the well field.

The Desalination Facility treats water from six brackish groundwater wells. The high TDS in the brackish water supply are removed through RO treatment. As designed, the plant recovers approximately 80% of the water treated. The remaining 20% contains high concentrations of TDS and is discharged to the Sweetwater River, near the mouth at the San Diego Bay. The concentrate discharge is permitted by the San Diego Regional Water Quality Control Board and includes limits for four metals. Changes in the influent concentration of the metals could negatively impact the concentration in the discharge. Although considered unlikely, any increase in concentration of the metals above the discharge limits could limit the ability to treat the well water without additional treatment of the discharge, at a considerable capital expenditure.

The brackish water wells are located within two miles of the San Diego Bay and within three miles of the Pacific Ocean. Any increase in the brackish water TDS levels due to the intrusion of salt water from the bay or ocean, could increase the cost of the RO process. However, groundwater studies conducted by Sweetwater conclude that no seawater intrusion is expected in the next 25-years.

7 Shortage Contingency Analysis

Effective management of water supply deficits is an important responsibility of Sweetwater. Possible deficits in Sweetwater's supplies may be caused by droughts, failures of major water transmission facilities during earthquakes, contamination of supplies due to chemical spills, or other adverse conditions. For these reasons, Sweetwater has established Board resolutions that currently serve as Sweetwater's Shortage Contingency Plan (SCP) and provide guidance for development of Board resolutions during future drought events.

7.1 Sweetwater's Local Groundwater Supplies

Sweetwater's local supplies consist of surface and groundwater supplies including potable well and brackish groundwater desalination. Starting in fiscal year 2006, the groundwater sources, which are drought resistant, will be able to produce a total of 6,800 acre-feet per year, which is approximate 22% of Sweetwater's 2030 dry-year demand of 30,238 acre-feet. Considering that local surface water would not be available, a 50% cutback in imported water to Sweetwater would likely result in a 40% reduction in deliveries to consumers in Sweetwater's service area.

7.2 Water Authority's Drought Management Plan

The Water Authority, in conjunction with its member agencies, is currently developing a Drought Management Plan (DMP) in the event that the region faces supply shortages due to drought conditions. Because Metropolitan has not developed an allocation plan to be implemented during supply shortages, the Water Authority and its member agencies are developing assumptions regarding Metropolitan supplies available during drought stages.

The Water Authority has formed a Technical Advisor Committee (TAC) made up of representatives from member agencies. Sweetwater is actively participating in the TAC and providing input on the development of the DMP. However, until a regional DMP is in place, it remains unclear how cutbacks to imported supply could affect Sweetwater. Once the regional DMP is in place, Sweetwater will reevaluate the SCP that was developed during the 1988 through 1992 drought, and has served as Sweetwater's SCP since that time.

7.3 Sweetwater's Shortage Contingency Plan

The following sections describe Sweetwater's drought response measures and the SCP that was developed in response to the drought of 1988 to 1992. Sweetwater has adopted Resolution 93-2 to declare a water shortage emergency, which will implement this plan. Sweetwater's drought related resolutions are included in Appendix F.

7.3.1 Response to Last Drought

On March 4, 1991, Sweetwater was notified that due to the severity of the drought, Metropolitan was going to reduce deliveries to 50% of the 1989-90 deliveries, effective April 1, 1991. With this action, Sweetwater passed Resolution 91-3 on March 20, 1991, and the resolution was put into effect on April 1, 1991 to meet this 50% reduction. Resolution 91-3 represented a 40% cutback for residential use based on a system-wide average, and a 20% reduction for commercial, industrial, and public use from 1989 usage. Since reduction measures were already in place in 1989, this was actually greater than an overall 20% reduction. In addition, irrigation and non-essential uses were restricted. With the use of Sweetwater's local wells, these restrictions were designed to meet a 50% reduction in imported water.

Prior to implementation of Resolution 91-3, the region began to receive precipitation, in late March of 1991. With the rainfall, the following courses of action were taken:

- On March 27, 1991, Sweetwater passed Resolution 91-4 to delay the restrictions set by Resolution 91-3 until April 15, 1991, pending action by Metropolitan regarding future deliveries of imported water.
- On April 10, 1991, Resolution 91-5 was passed by Sweetwater to further delay the deadline of Resolution 91-4 until May 1, 1991, pending action by Metropolitan regarding future deliveries of imported water.
- On April 24, 1991, Sweetwater passed Resolution 91-6, rescinding Resolutions 91-3, 91-4 and 91-5. Resolution 91-6 responded to a 20% reduction in imported water deliveries from the Water Authority via Metropolitan.
- On July 11, 1991, Resolution 91-7 was passed which amended 91-6. The major change to this resolution was to reduce the dollar amount of surcharges by approximately 50%.
- On July 24, 1991, Sweetwater passed Resolution 91-8, which amended 91-7. This resolution further reduced the amount of surcharge for residential use for exceeding the allotment set by Resolution 91-6. This resolution stated that if a residence exceeded its allotment, but water use was less than 30% of 1989 use for a like period, there would be no surcharge.
- On October 23, 1991 and January 1, 1992, Sweetwater passed Resolution 91-11 and 92-1, respectively, which made further minor adjustments to Resolution 91-8.
- On March 25, 1992, Sweetwater passed Resolution 92-7, which rescinded Resolution 92-1, and called for a 10% voluntary cut back from 1989 use. At this point, there were no more mandatory restrictions, surcharges, or penalties

At the peak of the most recent drought of 1988-92, water demand reductions and monitoring measures as required by the provisions of Sweetwater Resolutions 91-3 and 91-6 were implemented, and have become the general practices of Sweetwater. Therefore, it is envisioned that during any future cutbacks of imported supply, Sweetwater would implement similar resolutions to reduce and monitor demand reduction within the service area.

7.3.2 Water Demand Reduction

During the 1988 to 1992 drought, Sweetwater implemented the following programs to reduce demands, and monitor and enforce reduction measures. Since that time, these measures have become the general practices of Sweetwater. However, as noted above, Sweetwater will reexamine these measures once a regional DMP has been developed and adopted by the Water Authority. However, until that time, Sweetwater would take a similar approach to demand reduction and monitoring as was implemented during the drought of 1988 through 1992.

7.3.2.1 Public Education/Information

Sweetwater promoted water conservation in coordination with the Water Authority and Metropolitan. Regional activities included: public service announcements, demonstration gardens, monthly conservation strategy meetings, water awareness month activities, water efficiency workshops, landscape water use classes and student education programs. Sweetwater independently distributed public information through its bill inserts, on-hold telephone messages, annual Consumer Confidence Report, newsletters, news releases, brochures, keynote speakers, classroom presentations, facility tours, video library, and participation in special events, and community festivals.

An education specialist position was created to support a school water conservation education program, in addition to other activities. Sweetwater's Education Specialist provides instructional assistance, educational materials, and classroom lessons on water supply and use issues.

7.3.2.2 Restrictions on Nonessential Water Uses

The strictest conservation measures were taken in the winter of 1991 prior to the precipitation in the spring of 1991. These restrictions represent requirements of Sweetwater's Resolution 91-3, which represented a 50% reduction. The requirements of this resolution are outlined below.

- Golf courses, construction, and irrigation users were allocated 50% percent of their 1989 usage for like time periods. Golf courses could only irrigate trees and greens with potable water. Irrigation of fairways and roughs with potable water was prohibited.
- Irrigation of turf was restricted except for public parks, school grounds, and day-care centers, which were required by law. These users were limited to watering two times per week between 4 p.m. and 9 a.m. Exceptions were irrigation for the purpose of public safety (such as fire protection), and any of the above using reclaimed or greywater.
- Irrigation of ground cover was restricted except for fire protection and slope stabilization.
- Irrigation of trees and shrubs was permitted with a hand-held hose with a shutoff nozzle only, and watering between 4 p.m. and 9 a.m. only.
- Hosing of paved or hard surfaces including, but not limited to, sidewalks, driveways, patios, streets, and parking areas was prohibited except for the purpose of public safety.
- Filling of new residential swimming pools and spas was prohibited except under the following circumstances: where the owner could produce and demonstrate a conservation offset; or, where the owner could produce evidence that private well water was utilized. Draining of existing pools was prohibited except under orders of the appropriate local health or building official.
- Recreational, and ornamental lakes and ponds could not be filled or refilled except with reclaimed water or other non-potable water.
- Restaurants could serve water only upon request.
- Operation of ornamental fountains was prohibited except when non-potable or reclaimed water was used.
- Washing of vehicles was prohibited except in commercial car washes, commercial vehicles for reasons of public health and safety, where water had been salvaged from indoor use (warm up water from showers, sinks, etc.), by a mobile high pressure, low volume service.

7.3.2.3 Rationing Programs

In Resolution 91-3, Sweetwater established an allocation method for rationing water during drought stages. Although this allocation program is not currently in effect, the program could be instituted on short notice if required.

Reduction of Residential Use. Single-family residences were allotted a fixed quantity of water based on a family of four or less. There were additional allotments for families larger than four for each additional person over four, additional allotments for livestock such as horses or other large animals, medical conditions as determined

necessary by their doctor, and lot sizes larger than one-half acre could apply for an additional allotment. Multi-family residential users where allotments were based on a two-bedroom unit, with exceptions for more than two bedrooms.

Allotment consideration during future drought periods would be determined at that time considering future usage patterns and conservation measure implemented at that time.

Reduction of Commercial, Industrial, and Public Use. Commercial, industrial, and public users were allocated a percentage of their 1989 use for like time periods. There were exceptions if the business could prove that there was a significant change in their operation from 1989.

7.3.2.4 Drought Pricing

All users were allocated a predetermined amount of water as stated above. Users exceeding those amounts were surcharged as follows. The first billing period, in which the user exceeded their allotment for said billing period, a surcharge per 100 cubic feet for all use exceeding the allocation was added to the bill. The second time the use exceeded the allocation, a higher surcharge per 100 cubic feet for all use exceeding the allocation was added to the amount of the bill, and Sweetwater reserved the right to install flow restrictors at the meter.

In addition, to the surcharge penalties, Sweetwater provided written warnings and additional charges to the consumers' water bills for multiple violations.

7.3.2.5 Restrictions on New Services

Except for properties for which a building permit had been issued, no new potable water service was allowed, no new temporary or permanent meters were allowed, no commitments (such as will serve letters, certificates, or letters of availability) to provide water service were issued. Exceptions were as follows:

- The commitment included a notice that a water shortage emergency condition existed resulting in a water moratorium and water service was not currently available
- Projects necessary to protect the public's health, safety, and welfare
- When it could be demonstrated that no net increase in water usage would occur
- When a conservation offset was provided

7.4 Stages of Action

Sweetwater has developed a six-stage drought response plan allowing for water use cutbacks of 10 to 50% and more of imported supply. Although Resolution 92-1, which describes Sweetwater's allocation program is not currently in effect, the program could be instituted on short notice if required. Table 14 presents demand reduction goals of the plan.

Table 14 – Drought Stages of Action

Water Shortage Conditions	Drought Stage	Demand Reduction Goal	Program Type
None	I	0	N/A
Up to 10%	II	10%	Voluntary
15%	III	15%	Mandatory
20%	IV	20%	Mandatory
30%	V	30%	Mandatory
50%	VI	40%	Mandatory
System Failure ¹	Water Emergency	Severe ²	Mandatory

1. Loss of more than 50% supply
2. Water available only for public health and safety purposes

At each stage, the demand reduction measures will be implemented in varying combinations and monitored to ensure the demand reduction goals are met. During normal times, production figures are recorded daily and reported on a monthly basis. During Stage 1, totals are reported weekly to the Director of Water Quality, and monthly to the Operations Manager.

In Stages 2 and 3 shortages, daily production figures will be reported to the Director of Water Quality. The Director of Water Quality compares the weekly production to the target weekly production to verify that the reduction goal is being met. Weekly reports will be forwarded to the Operations Manager. Monthly reports will be sent to the Governing Board. If reduction goals are not met, the Operations Manager will notify the Governing Board so that corrective action can be taken.

During Stage 4, 5, and 6 water shortages, the procedure listed above will be followed, with the addition of daily production reporting to the Operations Manager.

During a disaster shortage, production figures will be reported to the Director of Water Quality hourly, and to the Operations Manager and Drought Response Team daily. Reports will also be provided to the Governing Board and the San Diego County Office of Disaster Preparedness.

7.5 Analysis of Revenue and Expenditure Impacts

Sweetwater's revenue is directly related to sales of water. Table 15 shows the projected water sales for each of the anticipated drought stages and a projection of the revenues, expenses, capital outlays, and surplus or deficiency for each stage of drought response based on water sales.

It is anticipated that capital outlay would be reduced to keep a surplus of revenues for each stage of drought. During a drought, both revenues and expenses are reduced. Since revenues decrease faster than expenses, reductions in capital outlay are necessary. Sweetwater's policy has been to account for revenue from surcharge

separately, and to use those monies only for water conservation activities or projects, which explore or develop new water supplies.

Table 15 - Estimated Revenues and Expenditures by Drought Stage

Drought Stage	2003-04 Normal	Stage II	Stage III	Stage IV	Stage V	Stage VI
Percent Reduction	0	10%	15%	20%	30%	40%
Estimated Water Sales	25,400	22,860	21,590	20,320	17,780	15,240
Total Revenue	33,840,937	31,411,485	30,208,778	29,006,072	26,600,660	24,195,247
Operating Expenses						
Source of Supply	\$8,598,750	\$7,738,875	\$7,308,938	\$6,879,000	\$6,019,125	\$5,159,250
Pumping	\$1,084,614	\$976,153	\$921,922	\$867,691	\$759,230	\$650,768
Water Treatment	\$2,578,365	\$2,320,529	\$2,191,610	\$2,062,692	\$1,804,856	\$1,547,019
Trans and Dist (Operations)	\$1,326,146	\$1,326,146	\$1,326,146	\$1,326,146	\$1,326,146	\$1,326,146
Trans and Dist (Maintenance)	\$2,238,952	\$2,238,952	\$2,238,952	\$2,238,952	\$2,238,952	\$2,238,952
Customer Service	\$1,227,233	\$1,227,233	\$1,227,233	\$1,227,233	\$1,227,233	\$1,227,233
Admin. & General	\$5,180,750	\$5,180,750	\$5,180,750	\$5,180,750	\$5,180,750	\$5,180,750
Employees Benefits	\$3,377,537	\$3,377,537	\$3,377,537	\$3,377,537	\$3,377,537	\$3,377,537
General Plant Maint.	\$598,266	\$598,266	\$598,266	\$598,266	\$598,266	\$598,266
Other Operating Expenses	\$294,584	\$294,584	\$294,584	\$294,584	\$294,584	\$294,584
Allocation of Overhead	\$(1,033,125)	\$(1,033,125)	\$(1,033,125)	\$(1,033,125)	\$(1,033,125)	\$(1,033,125)
Conservation Expenses	\$47,170	\$47,170	\$47,170	\$47,170	\$47,170	\$47,170
Debt Service (P&I)	\$3,592,481	\$3,592,481	\$3,592,481	\$3,592,481	\$3,592,481	\$3,592,481
Total Expenses	\$29,111,723	\$27,885,550	\$27,272,464	\$26,659,377	\$25,433,204	\$24,207,031
Capital Outlay	\$4,729,214	\$3,525,934	\$2,936,315	\$2,346,695	\$1,167,455	\$0
Surplus or Deficiency	\$0	\$0	\$0	\$0	\$0	\$(11,784)

In order to mitigate the financial impacts of a water shortage, Sweetwater has established a Rate Stabilization Fund. The goal of this fund is to stabilize rates during drought periods and at other times of declining revenue. This rate stabilization fund was implemented in the 1992-93 budget with a beginning balance of \$262,000. The balance at the end of the fiscal year (2004-2005) was \$420,300. The plan is to add to this fund annually, until it could replace lost revenue for capital outlay at a Stage VI drought response level for a two-year period. This would allow Sweetwater to maintain stabilized rates.

7.6 Sweetwater Emergency Response Plan

A Vulnerability Assessment (VA) was completed for Sweetwater in February 2003 that identified, quantitatively, the critical facilities and vulnerabilities of the water system. Though the VA addressed issues related to terrorism, the findings can be applied to natural disasters in that the same scenarios (i.e., loss of critical pump

stations, etc.) were used to determine damage assessment. Because the VA specifically points out system areas of weakness that could be used against the system, it is not included nor is any part of it reproduced in this UWMP.

Sweetwater's Emergency Response and Recovery Plan, updated subsequent to the VA in August 2003, is in compliance with Section 1443 (b) of the Safe Drinking Water Act, as amended by the Public Health Security and Bioterrorism Preparedness Act of 2002. The Plan has been designed for conformance with the Standardized Emergency Management System (SEMS) as defined in Government Code Section 8607, and is to be used in conjunction with the State Emergency Plan and local emergency plans. The Emergency Response and Recovery Plan is too large to include as an appendix or to reproduce in this UWMP.

The Emergency Response and Recovery Plan is designed to address organized response to emergency situations associated with natural disasters, technological incidents, and national security emergencies in or affecting Sweetwater's facilities and its service area. The Plan describes the following:

- Sweetwater's emergency management organization which is required to assist in mitigating any significant emergency or disaster
- Authorities, policies, responsibilities, and procedures which are required to protect the health and safety of customers, personnel, and facility property
- Operational concepts and procedures associated with field response to emergencies, Emergency Operations Center (EOC) activities, and the recovery process
- Implementation of the Standardized Emergency System (SEMS) for use within the San Diego County operational area, regional and state systems
- Multi-agency and multi-jurisdictional coordination
- Pre-event emergency planning as well as emergency operations procedures

Detailed procedures for the following situations, including actions plans, are addressed in the Emergency Response and Recovery Plan:

- Extensive Power Failure
- Communications Failure
- Water Treatment Failure at the Perdue Plant
- Imported Water Supply Failure
- Structural Failure – Storage Facilities and Pump Stations
- Structural Failure – Transmission System
- Contamination – Physical, Biological, and Radiological
- Natural Disaster – Earthquake, Flood, Storm, or Fire
- Security Measures – Armed and Dangerous Intruder
- Bombs and Explosions
- Dam and Reservoir Controlled Releases

Appendix A
California Urban Water Management Planning Act