IRP Implementation Status and Potential Development Needs

There are two purposes for this paper. The first purpose is to document the current status of IRP resource development. Through the IRP, Metropolitan and its member agencies have been developing and implementing water resources programs and activities. This paper is structured to provide the following information for the different resource categories identified in the IRP:

1. Resource Category Description
2. Current IRP Target and Development Status
3. Changed Conditions, Successes and Challenges
4. Current Implementation Approach

The second purpose is to provide a perspective on the range of potential resource development needs. The range and balance between supplies and demands, as well as a discussion on the frequency of occurrence of additional water supply needs is important when discussing impacts on resource development strategies. This paper includes a generalized gap analysis between the supplies that comprise the current status of IRP resource development, and an estimate of the demands for water under representative dry, normal, and wet water supply conditions.

Summary

The 1996 IRP and the 2004 IRP Update set 2010 targets for the development of an array of dry-year water resources. The success in developing numerous dry-year supply programs on Colorado River is an example of a water resource area that is ahead of targets. The new and unprecedented operational constraints facing the State Water Project is an example of a resource area that is not on track to meeting its 2010 dry-year targets. The constraints on the State Water Project are particularly important for the IRP because of how the decrease in frequency and magnitude of surplus conditions is having an impact on other water resource programs – Central Valley storage and transfers, in-region groundwater storage and in-region surface water storage. The Bay-Delta operational constraints likely will continue until a long-term solution has been identified and implemented.

To provide a perspective on the range of potential resource development needs that Metropolitan and its member agencies may need to address in the IRP Update, a Gap Analysis has identified the potential difference between supplies and demands from 2015 to 2035. Before accessing supplies in any storage program, the range of initial dry-year gaps ranges from 1.1 MAF in 2015 to 1.3 MAF in 2035. Results for normal and wet years suggest a range of potential surpluses (.24 MAF in 2010 to over a million acre-feet in 2035). However, the frequency of these years and the quantities of surplus relative to the overall water management challenge is less than needed due to the restrictions facing the State Water Project. Further analysis using the Robust Decisionmaking Method will help to provide more complete information to guide future IRP discussions.

Status of Development by Resource Area

Conservation

Description

Metropolitan's dedication to conservation since the early 1990s carried through the 1996 IRP and beyond, where conservation was considered to be a commitment to California "Best Management Practices". Because of this commitment to conservation, the IRP target is essentially a metric to measure how much conservation savings might occur, as opposed to a development goal. Total conservation targets for Metropolitan's service area use 1980 as a base year for measuring savings. Models used in the 1996 IRP and the IRP Update estimates conservation savings based on expected reductions in water consumption from four different categories:

1. Active: savings from Metropolitan and member agency-funded conservation programs. These programs are mostly aligned with the Best Management Practices (BMPs) and also include new water savings programs identified through research and pilot programs like Metropolitan's Enhanced Conservation program.

2. Code-based: savings from measures that have been incorporated into California's plumbing codes by legislative action. These actions, like the 1992 Plumbing Code, were strongly supported by Metropolitan.
3. Price Effect: savings due to increases in retail water rates and conservation rate structures enacted since 1990. Increases in price induce consumers to improve their water use efficiency through behavioral and structural means that are not captured by estimates of Active and Code-Based Savings.
4. Pre-1990: conservation from the 1980 California plumbing codes and price increases between 1980 and 1990. These savings are split out from the Code-Based savings that accrued from the 1992 Plumbing Code and beyond.

There are no targeted savings quantities estimated for public awareness campaigns and education. It has been widely accepted that such separate programs are essential and beneficial to prompt consumers to install water saving fixtures and increase the regions conservation savings, which are captured by the savings categorized above.

Current IRP Target and Development Status

The 1996 IRP estimated that the 2010 conservation savings would be approximately 738,000 acre-feet. The 2004 IRP Update revised conservation savings estimate to 865,000 acre-feet by 2010.

The following table shows the estimated conservation savings by category for 2010. As shown, conservation programs currently in place are on track to exceed the 2010 estimate from the 2004 IRP Update.

Estimated Conservation Savings: 2010[1]

Category	Acre-feet
Active	125,000
Code-based	319,000
System Loss & Unmetered	33,000
Price Effect	165,000
Pre-1990 Conservation	250,000
Total	**892,000**

Changed Conditions, Successes and Challenges

The challenge to continuing to implement conservation is to devise effective approaches for reducing outdoor water use. Staff has worked to develop relationships with other interests and potential partners, which can lead to mutually beneficial conservation programs. Other challenges exist in understanding and quantifying the water savings from various programs - such as WBICs and California Friendly™ landscaping, and encouraging greater public participation in active conservation programs. A major changed condition is the recent wave of water use and conservation ordinances that are in effect as a result of the implementation of Metropolitan's Water Supply Allocation Plan. This has highlighted the need for conservation, and has also greatly increased the demand for water saving devices and strategies. There is also a heightened legislative perspective on conservation, with the California Governor calling for the state to achieve a 20 percent per-capita savings of water by the year 2020.

Current Implementation Approach

Metropolitan encourages water-use efficiency through research and development, financial incentives, programs to influence consumer behavior, education, new plumbing and compliance codes, support of legislation and retail customer conservation through tiered pricing. Between 1990 and 2008, Metropolitan invested more than $223 million in conservation incentives through its programs, with estimated Active Conservation savings of 125,000 acre-feet annually. Metropolitan extends incentives to residential, commercial, and industrial sectors and

[1] These numbers use 1980 as the base year

public agencies to encourage the use of water-efficient technologies and business practices. Incentive-based programs are complemented by public outreach and education activities, many of them tied to the California Friendly marketing effort launched in 2006.

Local Resources – Recycling, Groundwater Recovery, Seawater Desalination

Description

Local Resources are those projects and supplies geographically sited within the service area. In the context of the IRP, development of these local resources benefit the region as a whole by offsetting imported water demands, and thus making additional imported water available to the entire service area. Development under this resource category includes three areas of local supplies: 1) Recycled water projects that offset potable water demand, including groundwater recharge projects that help to increase groundwater usage and sustainability, 2) Groundwater Recovery projects that treat contaminated and previously unusable groundwater supplies, and 3) Seawater Desalination projects that treat highly saline ocean water making it suitable for potable uses. The 1996 IRP targets for local resources development included investments in water recycling and groundwater recovery, and specifically excluded Seawater Desalination. Seawater Desalination was included as a local resource in the 2004 IRP Update.

Current IRP Target and Development Status

The 1996 IRP combined water recycling and groundwater recovery elements to establish a local resources production target of 410,000 acre-feet per year by 2010. The 2004 IRP Update set a year 2025 target for combined water recycling, groundwater recovery, and seawater desalination elements that totaled 750,000 acre-feet per year (this included an increase of 250,000 acre-feet as a share of a locally-developed supply buffer). If the entire 250,000 acre-feet of locally-developed supply buffer was applied to the 2010 target, then the target would be 660,000 acre-feet.

The following table shows the estimated local resources development by category for 2010. As shown, the programs currently in place are on track to exceed the basic 2010 target from the 2004 IRP Update, but not the full target including the 250,000 acre-foot buffer.

Local Resources Production

Current Programs	Acre-feet
Recycling Projects	341,000
Groundwater Recovery Projects	105,000
Seawater Desalination Projects	0
Total:	***446,000***

Changed Conditions, Successes and Challenges

Heightened awareness of potentially scarce overall water supplies has increased support for the development and use of recycled water. Permitting of recycled water use has also become more streamlined as agencies are establishing track records of similar projects, and also because of more advanced treatment of the recycled water. Orange County Water District was successful in bringing its Groundwater Replenishment System online, which is notable as being a large indirect potable groundwater recharge project that overcame public perception issues in some part due to the four-stage advanced treatment process.

A significant potential challenge to meeting longer-term local resource program goals involves large-scale seawater Desalination. Seawater Desalination brings a host of uncertainties in the process of moving from small-scale demonstration projects to larger scale projects: development decisions, technological issues, and environmental considerations are some of the challenges in implementing these projects. A large-scale Seawater Desalination project in Carlsbad, CA is expected to be online by 2011. This project continues to shed additional light on the permitting, construction, and cost issues associated with Seawater Desalination.

In April 2007, Metropolitan's Board adopted updated administrative policy principles for Local Resources Program implementation with the intention of accelerating project development. The new principles allow for an open process to accept and review project applications submitted on a continuous basis, with a goal of the development of an additional 174,000 acre-feet per year of local water resources toward the 2025 IRP Target and buffer.

Current Implementation Approach

While recycled water and groundwater recovery projects in the Southern California region are primarily developed by local water agencies, many newer projects have been developed with financial incentives provided through Metropolitan's Local Resources Program (LRP). The LRP is a performance-based program that provides financial incentives to develop and produce water supplies from Recycling, Groundwater Recovery, and Seawater Desalination. Up until 2007, the LRP operated under a Request for Proposals approach, where agencies would propose potential projects for funding. Metropolitan initiated an LRP task force effort with its member agencies to review the LRP policy and approach, and to determine whether any changes should be made. The findings and recommendations from this task force were used to improve and update the LRP program. As of 2007, there is now a continuous-application process under which new projects are submitted for funding.

The overall IRP target for local resources development is a total regional combined target, and includes programs developed entirely by member and retail agencies without Metropolitan funding, and the programs developed with Metropolitan's LRP funding program.

Central Valley Storage and Transfers

Description

The 1996 IRP established a major goal of increasing the reliability of supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Metropolitan's strategy has been to focus on voluntary programs designed to improve regional reliability while benefiting the partners selling the water supply or providing storage. The storage and transfer target under the IRP includes programs that bank Metropolitan's SWP water supplies, as well as short and longer-term water transfer programs using SWP facilities.

Current IRP Target and Development Status

The 1996 IRP established the target for dry-year yield from Central Valley Storage and Transfers at 300,000 acre-feet by 2010. This target was maintained in the 2004 IRP Update. The 2004 IRP Update also set a year 2025 target of 250,000 acre-feet as a share of an imported supply buffer. If the entire 250,000 acre-feet of imported supply buffer was applied to the 2010 target, then the target would be 550,000 acre-feet. It is important to note that reliability under both the 1996 IRP and 2004 IRP Update also relied upon the ability to access dry-year water transfers in addition to banked water through option contracts and spot-market purchases like the California Drought Water Bank. Although the development of water banking agreements are on track to meet the 2010 targets, the availability and quantity of water supplies for option contract and spot-market purchases is less than previously anticipated because of environmental and regulatory restrictions affecting pumping in the California Bay-Delta area, and because of the difficulty in securing environmental documentation and permitting for multi-year water transfers.

The following table shows the estimated development for the Central Valley programs for 2010. Note that two figures are shown for each program, the Contract Minimum as well as the Contract Capability. The reason for the two figures is that, with the Central Valley Banking Programs, the contracts obligate Metropolitan's partner agency to a minimum yield. However, those contracts also allow Metropolitan to use other contractor's unused capacity in the same programs. These are also shown on the table because actual operational history has shown additional capacity above Contract Minimums to be available to Metropolitan. As shown, the programs currently in place are on track to exceed the basic 2010 target from the 2004 IRP Update, if the range between Contract Minimum and Contract Capability is considered, but not the full target including the 250,000 acre-foot buffer.

Central Valley Storage and Transfer Dry-Year Supplies: 2010

Current Programs	Contract Minimum Acre-feet	Contract Capability[2] Acre-feet
Semitropic Program	32,000	133,000
Arvin-Edison Program	40,000	75,000
San Bernardino Valley MWD Program	20,000	50,000
Kern Delta Program	50,000	50,000
Subtotal of Current Programs	***142,000***	***308,000***

Changed Conditions, Successes and Challenges

Metropolitan has been successful in implementing and operating voluntary water banking programs with partners in the Central Valley, with hundreds of thousands of acre-feet stored and recovered in response to water supply conditions. In addition, withdrawals of water from these programs have consistently exceeded contract minimums, increasing the confidence of having unused capacity available to Metropolitan during times of need.

The major changed condition and challenge for the banking programs is the reduction of both the quantity and frequency of surplus water supplies for storage due to environmental and regulatory restrictions in the California Bay-Delta. Although these restrictions do not significantly impact dry-year supplies, they significantly impact average and wet year supplies. The success of operating the Central Valley banking programs relies upon having surplus water to refill storage for use in times of need. If the conditions affecting the loss of surplus water continue, the banking programs will lose its effectiveness as part of the IRP portfolio.

The environmental and regulatory restrictions are also impacting access to additional voluntary water transfers. Water supplies for the entire state are being affected, which in turn affects the price and quantity of water that can be procured under option agreements or through spot-market purchases like the California Drought Water Bank.

Another challenge for voluntary water transfers is the difficulty and implications of environmental review, documentation, and permitting for multi-year agreements.

Current Implementation Approach

Metropolitan is continuing to pursue transfer agreements and relationships with entities in the Central Valley, with an eye toward developing multi-year option transfer agreements. Development of additional storage programs is currently on hold.

In-Region Groundwater Storage

Description

Groundwater basins within Metropolitan's service area provide the potential for operational flexibility to manage the water supply in Southern California. Since the 1950s, conjunctive use has been used for local water management. More than 70 recharge facilities are replenishing groundwater basins throughout Southern California. The IRP looked to build upon the flexibility of the groundwater basins to store water by establishing targets for conjunctive use storage projects. These projects are generally described as agreements where Metropolitan provides funding for the construction of groundwater storage and extraction facilities, stores water at its own cost, and retrieves stored water at its call. The stored water, when called, is sold to the partnering member agency at firm rates. In all cases, the agreements do not require Metropolitan to pay for storage capacity within a groundwater basin.

[2] Contract Capability generally means that the partner agency is obligated to meet the contract minimum but will deliver up to the contract capability amount depending on conditions.

Current IRP Target and Development Status

The 1996 IRP set targets for dry-year yield of 275,000 acre-feet in 2010 and 300,000 acre-feet in 2020. The 2004 IRP Update extended the target to 2025. These In-Region Groundwater Storage targets include the dry-year yield from groundwater storage programs within the region, existing Cyclic Storage and the Replenishment Rate program.

The following table shows the development for the in-basin groundwater storage programs for 2010. As shown, the programs currently in place are not on track to meet the 2010 target

In-Region Groundwater Dry-Year Supplies: 2010

Current Programs	Acre-feet
Chino Basin CUP	33,000
Compton CUP	1,000
Elsinore CUP	4,000
Foothill CUP	3,000
Lakewood CUP	1,000
Live Oak CUP	1,000
Long Beach CUP	4,000
North Las Posas CUP	47,000
Orange County CUP	20,000
Upper Claremont CUP	1,000
Cyclic Agreements	80,000
Total	**195,000**

Changed Conditions, Successes and Challenges

From the time the 1996 IRP was approved, Metropolitan has been successful in implementing new agreements with its member agencies for groundwater storage programs. Nearly 200,000 acre-feet of dry year yield has been developed throughout the service area. In more recent years, however, there have been some challenges in implementing groundwater storage programs to fully meet the IRP targets. To more clearly identify those challenges, Metropolitan initiated a Groundwater Assessment Study in 2007. The study found that a number of factors, including institutional disagreements, conveyance, recharge, and extraction facility needs, and water quality considerations, were impediments to completing additional storage agreements. As a result of the study, Metropolitan and its member agencies have been engaged in a Groundwater Working Group, which is focused on identifying ways to improve future programs and agreements and optimize the use of groundwater basin resources in the service area.

Groundwater storage programs also face the same major changed conditions and challenges as the Central Valley banking programs: the reduction of both the quantity and frequency of surplus water supplies for storage due to environmental and regulatory restrictions in the California Bay-Delta. If the conditions affecting the loss of surplus water continue, the groundwater storage programs will lose its effectiveness as part of the IRP portfolio.

Environmental and regulatory restrictions are also impacting access to replenishment supplies by the member agencies. This is leading to additional stress on the groundwater basins, which may in turn lead to reduced groundwater production.

Current Implementation Approach

Metropolitan is continuing to work with the member agencies through the Groundwater Working Group. Development of additional storage programs is currently on hold.

In-Region Surface Water Storage

Description

Facilities that are currently considered in this resource are:

- Metropolitan Reservoirs (Diamond Valley Lake, Lake Mathews, Lake Skinner)
- Flexible Storage in DWR reservoirs (Castaic Lake, Lake Perris)

Current IRP Target and Development Status

The 1996 IRP and 2004 IRP Update identified an in-region surface water target of 620,000 acre-feet of dry-year storage for each of the years 2010, 2020, and 2025.

The following table shows the development for the in-basin surface water storage for 2010. As shown, the programs currently in place exceed the 2010 target.

In-Region Surface Storage Dry-Year Supplies: 2010

Current Programs	Acre-feet
Diamond Valley Lake	600,000
Lake Mathews	100,000
Lake Skinner	10,000
DWR Flexible Storage	219,000
Total	**929,000**

Changed Conditions, Successes and Challenges

Metropolitan has been very successful in developing surface water storage in its service area. This year, Metropolitan also completed the tunneling of the Inland Feeder Project, which will greatly increase the ability to move large quantities of water into Diamond Valley Lake in shorter periods of time.

The major changed conditions and challenges for in basin surface storage is the same as for other storage and banking: the reduction of both the quantity and frequency of surplus water supplies for storage due to environmental and regulatory restrictions in the California Bay-Delta. If the conditions affecting the loss of surplus water continue, the in basin surface storage programs will lose their effectiveness as part of the IRP portfolio.

Current Implementation Approach

Metropolitan has exceeded the targeted development of in-basin surface storage, and is not pursuing additional development at this time.

Colorado River Aqueduct

Description

California has a right to Colorado River water in the amount of 4.4 million acre-feet per year. Within this right, Metropolitan holds the fourth priority basic apportionment of 550,000 acre-feet per year. Metropolitan also holds a right for an additional 662,000 acre-feet per year, depending on availability of surplus supplies.

The IRP target for Colorado River supplies includes Metropolitan's basic apportionment as well as supplies from storage and transfer programs that combine to fill the Colorado River Aqueduct (CRA) capacity.

Current IRP Target and Development Status

In the 1996 IRP, the target for supplies from the CRA was 1.2 million acre-feet per year. That total was expected to come from the basic apportionments plus the development of banking programs and transfers. The 2004 IRP Update adopted a revised policy of utilizing the full capacity of the CRA when needed through the basic apportionment and various water banking and water transfer programs. The 2004 IRP Update targets set the total CRA dry-year deliveries to 879,000 acre-feet in 2010 and 1,250,000 in both 2020 and 2025.

The following table shows the development for the Colorado River Aqueduct for 2010. As shown, the programs currently in place exceed the 2010 target.

Colorado River Aqueduct Dry-Year Supplies: 2010

Current Programs	Acre-feet
Basic Apportionment – Priority 4	550,000
IID/MWD Conservation Program	85,000
Priority 5 Apportionment (Surplus)	0
PVID Land Management Program	120,000
Lower Colorado Water Supply Project	7,000
Lake Mead Storage Program	400,000
Recovery of Water Stored by CAWCD	5,000
SNWA Agreements	30,000
Quechan Settlement Agreement Supply	13,000
Forbearance for Present Perfected Rights	(34,000)
CVWD SWP/QSA Transfer Obligation	(35,000)
Drop 2 Reservoir Funding	32,000
Subtotal of Current Programs	***1,173,000***
Additional Non-Metropolitan CRA Supplies	**Acre-feet**
SDCWA/IID Transfer	70,000
Coachella & All-American Canal Lining	96,000
Subtotal of Additional CRA Supplies	***166,000***
Total Supply Capability (Not limited by capacity)	**1,339,000**

Changed Conditions, Successes and Challenges

Through the Quantification Settlement Agreement and through the pursuit of partnerships and programs, Metropolitan has been very successful in developing Colorado River programs. In addition, Metropolitan also gained access to banking water in Lake Mead through the Intentionally-Created Surplus program (ICS). It must be noted that the Lake Mead ICS, along with any other storage agreements that potentially augment Colorado River supplies, are storage programs. In the context of the IRP targets, it was expected that the ability to deliver a full Colorado River Aqueduct when needed would rely upon a combination of programs, including storage. For

this reason, the table above appears to show that targets are exceeded. This is in fact true, if those storage programs have water that can be withdrawn in a needed year.

Storage on the Colorado River also faces the same major changed condition and challenge as for other storage and banking: the reduction of both the quantity and frequency of surplus water supplies for storage due to environmental and regulatory restrictions in the California Bay-Delta. Even though these programs are on the Colorado River, the ability to store water essentially comes from an overall surplus water balance. If the conditions affecting the loss of surplus water continue, the storage programs that augment Colorado River supplies will not be able to contribute to filling the Colorado River Aqueduct when needed.

Current Implementation Approach

Although Metropolitan has exceeded the targeted development of Colorado River programs, there has been a great deal of success in securing agreements for exchanges and transfers in recent years, which has helped to make up for some deficiencies in other areas. Metropolitan is continuing to pursue these agreements to help balance the overall water supply and demand picture for the service area.

State Water Project

Description

Metropolitan's State Water Project (SWP) target includes water delivered through the State Water Contract, which includes Table A contract supplies, use of carryover storage in San Luis Reservoir, and use of Article 21 interruptible supplies.

Metropolitan holds a 1,911,500 acre-feet contract for annual deliveries from the State Water Project. However, water quality and supply reliability challenges due to variable hydrology and environmental standards limit the amount of the contract that can be fulfilled from year to year.

Current IRP Target and Development Status

Metropolitan's Board set goals for SWP supplies with the adoption of CALFED Policy Principles in August 1999. The policy set a long-term average annual supply goal of 1,500,000 acre-feet per year. For dry years the principles called for 463,000 acre-feet by 2010 and 650,000 acre-feet of from the SWP by 2020. However, the CALFED process and final Record of Decision did not implement the physical facilities needed to meet the water supply targets described by Metropolitan's policy goals. Subsequent board policy on Bay-Delta improvements removed specific supply targets and focused on improvements to ecosystem, water quality, and supply reliability. Attention to these improvements will provide better mechanisms for managing the State Water Project, and return water supply reliability to a priority equal to environmental and regulatory issues.

The following table shows the development for the State Water Project supplies for 2010. As shown, the programs currently in place do not meet the 2010 target. In addition, the developed supplies also assume that carryover storage in San Luis Reservoir would be available for use in a dry year. Because of the environmental and regulatory challenges on the State Water Project, it is likely that this water would not be available in the quantities shown.

State Water Project Dry-Year Supplies: 2010

Current Programs	Acre-feet
MWD Table A	128,000
DWCV Table A	5,000
Article 21	0
San Luis Carryover	286,000
SWP Call-back of DWCV Table A Transfer	7,000
Yuba River Accord Purchase	18,000
Total Supply Capability	***444,000***

Changed Conditions, Successes and Challenges

The major changed condition and challenge affecting the supplies from the State Water Project is the imposition of additional and unforeseen environmental and regulatory restrictions in the California Bay-Delta. The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts have adversely impacted State Water Project operations and limited the flexibility of the State Water Project. Currently, five species (the winter-run and spring-run Chinook salmon, Delta smelt, North American green sturgeon and Central Valley steelhead) are listed. In addition, in March 2009 the California Fish and Game Commission listed the longfin smelt for protection under the California ESA. In the past two years, courts have ordered new Biological Opinions on Delta smelt and Chinook salmon, both of which severely impact the ability to export water on the State Water Project.

These restrictions not only impact the State Water Project supplies in a given year, they also impact the frequency and magnitude of surplus conditions for Metropolitan's overall supply and demand. As previously stated in this paper, the decrease in frequency and magnitude of surplus conditions greatly impacts Metropolitan's ability to manage dry conditions through the use of its storage portfolio. The restrictions also severely limit the ability to use the existing conveyance facilities of the State Water Project to facilitate the movement of water between voluntary participants in a water transfer market.

Current Implementation Approach

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. The Delta Vision process, established by Governor Schwarzenegger, is aimed at identifying long-term solutions to the conflicts in the Bay-Delta, including natural resource, infrastructure, land-use and governance issues. In addition, State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay-Delta Conservation Plan, which is aimed at addressing ecosystem needs and securing long-term operating permits for the State Water Project.

Local Supplies

Description

Groundwater pumping and surface water production accounts for a significant portion of the region's total water supply. Normal groundwater and surface water resources in the region provide an average annual supply of 1.3 million acre-feet. Los Angeles Aqueduct deliveries also provide a significant amount of water supply to the city of Los Angeles, offsetting the need for imported water supplies.

Current IRP Target and Development Status

Because normal groundwater, surface water, and Los Angeles Aqueduct deliveries are locally controlled and operated, Metropolitan did not establish specific resource development targets for these deliveries. However, because they do make up a large portion of the total regional water supply, estimates of these locally produced

water supplies are key in IRP reliability analyses. Significant changes in these supplies due to environmental, water quality, or other reasons will affect the overall water supply balance for the service area. Over the past several years, these types of issues have affected the Los Angeles Aqueduct system deliveries and to some extent, groundwater production. Staff continues to coordinate information and monitor factors affecting these resources. However, it would be a valuable improvement to the IRP process to identify actions needed to maintain or improve local supply production.

Generalized Static Gap Analysis

Purpose and Approach

The gap analysis presented in this paper is provided to give a perspective on the range of potential resource development needs that Metropolitan and its member agencies may need to address through the IRP Update. It is constructed as a simple mass balance of supplies and demands, shown under three static water supply and demand conditions (Dry, Wet, and Normal). The water balances include all non-storage water supply programs currently developed. However, it is not a comprehensive and integrated analysis of the resources shown. As such, the analysis does not lend any information as to impacts of the frequency of occurrence of these static water supply conditions on storage capability and use. It also needs to be noted that this analysis does not include any type of uncertainty in either the supply development paths or in the major demographic drivers of demand. As previously reported, comprehensive and integrated analysis will be done in the IRP Update process with the Rand Corporation's Robust Decisionmaking Method, which will include extensive uncertainty analysis and full integration of storage resources. Including additional uncertainties will likely show scenarios that increase the gaps between supplies and demands relative to the static analysis presented in this paper.

The tables that are shown have the following major assumptions:

1. Retail Municipal and Industrial demands are estimated using Southern California Association of Governments and San Diego Association of Governments 2007 demographic projections
2. Water resources included are those developed and committed to date, and are shown to grow to their estimated full yields through 2035
3. State Water Project yields are estimated from long-term CALSIM modeling studies from DWR's 2008 SWP Reliability Report, which had restrictions for Delta smelt based on the Federal Court remedy. Note that the current Biological Opinion for Delta smelt is more severe in terms of impacts to SWP deliveries. Also note that additional impacts from the recent Chinook salmon Biological Opinion are not included in this analysis. Representative Table A allocations under Dry, Wet, and Normal years are estimated to be 20 percent, 60 percent, and 80 percent respectively.
4. Gaps between supply and demand do not include any use of Metropolitan's storage portfolio. The approximate capacity of storage is 5 MAF. It is reasonable to assume that some storage resources may be available to meet the listed gaps between supply and demand. However, because of the challenges in moving and storing water under the regulatory restrictions on the State Water Project and the fact that these restrictions effectively decrease the frequency of surplus storage conditions, it is more likely that storage will not be at adequate levels to fully meet gaps between supplies and demands.
5. The tables are set up so that a positive gap indicates that additional resources are needed. A negative gap indicates that water would be available to put into storage programs and water management accounts.

Dry-Year Gap

The dry-year gap shows the most severe gap between supplies and demands. Water demand increases in dry conditions, while many water supplies will decrease in yield in dry conditions. State Water Project supplies are estimated to be at 20 percent of Table A. This is a representative average of critical and dry conditions based on a long-term CALSIM modeling study. The approximate probability of exceedence for this type of dry condition is close to 95 percent, making this a relatively extreme case. The range of initial gaps before any storage program withdrawal is 1.15 MAF in 2015 to 1.3 MAF in 2035.

Dry-Year Supply and Demand Balance					
Supply Balance	**2015**	**2020**	**2025**	**2030**	**2035**
Retail Demand					
Retail Demand with Conservation	*4,547,000*	*4,684,000*	*4,743,000*	*4,821,000*	*4,889,000*
Local Supplies					
Groundwater Production	1,410,000	1,430,000	1,440,000	1,450,000	1,470,000
Surface Production	60,000	60,000	50,000	50,000	50,000
Los Angeles Aqueduct	30,000	30,000	30,000	30,000	30,000
Seawater Desalination	-	-	40,000	70,000	70,000
Groundwater Recovery	120,000	120,000	120,000	120,000	120,000
Recycling	380,000	400,000	410,000	410,000	410,000
Other	7,000	7,000	7,000	7,000	7,000
Existing Local Supplies	*2,007,000*	*2,047,000*	*2,097,000*	*2,137,000*	*2,157,000*
CRA Supplies					
Basic Apportionment	550,000	550,000	550,000	550,000	550,000
Surplus	-	-	-	-	-
Salton Sea	-	-	-	-	-
IID-MWD Conservation	85,000	85,000	85,000	85,000	85,000
PVID Fallowing	120,000	120,000	120,000	120,000	120,000
IID-SDCWA Exchange	100,000	193,000	200,000	200,000	200,000
Canal Lining SDCWA	80,000	80,000	80,000	80,000	80,000
Canal Lining SLR	16,000	16,000	16,000	16,000	16,000
LCWSP	7,000	7,000	7,000	7,000	7,000
Quechan Settlement Agreement	13,000	13,000	13,000	13,000	13,000
SNWA Agreements	40,000	40,000	-	-	-
CVWD QSA Transfer	(35,000)	(35,000)	(35,000)	(35,000)	(35,000)
PPR's, 1,2,3b Ag etc.	(47,000)	(47,000)	(47,000)	(47,000)	(47,000)
Existing CRA Supplies	*929,000*	*1,022,000*	*989,000*	*989,000*	*989,000*
Existing SWP Supplies	20%	20%	20%	20%	20%
MWD Table A	382,000	382,000	382,000	382,000	382,000
DWCV Table A	39,000	39,000	39,000	39,000	39,000
Article 21	-	-	-	-	-
SBVMWD Minimum Purchase	20,000	20,000	20,000	20,000	20,000
Yuba River Accord Purchase	15,000	15,000	15,000	15,000	15,000
SWP Supplies with Current BO	*456,000*	*456,000*	*456,000*	*456,000*	*456,000*
Initial Gap	**1,155,000**	**1,159,000**	**1,201,000**	**1,239,000**	**1,287,000**

Normal-Year Gap

The normal-year gap indicates that a very modest amount of supplies may be available to put into storage programs. This is because, under normal conditions, water demand remains at relatively moderate levels, and water supplies, both local and imported, are also expected to be at moderate levels. State Water Project supplies are estimated to be at 60 percent of Table A. This is a representative overall average of hydrologic outcomes based on the long-term CALSIM modeling study. The approximate probability of exceedence for this average condition is 65 percent. The range of initial surplus supplies shown in the normal-year gap analysis is .21 MAF in 2015 to 0.94 MAF in 2035. It is important to note that, although surplus supplies appear to be available in normal years and that the probability of exceedence is greater than 50 percent, the quantity of estimated surplus is very small in comparison to both the total storage capacity available to manage surplus water (~5 MAF) and in comparison to the size of the dry-year gap between supply and demand described in the Dry-Year Gap section (~1.1 MAF). As a point of reference, prior to the institution of the recent restrictions on supplies from the California Bay-Delta, hydrologic conditions occurring with the same probability of exceedence would have resulted in an 80 percent Table A allocation. This is an additional 500 TAF of surplus water supplies that could have been stored and managed under identical precipitation and hydrologic conditions.

Wet-Year Supply and Demand Balance

Supply Balance	2015	2020	2025	2030	2035
Retail Demand					
Retail Demand with Conservation	*4,091,000*	*4,207,000*	*4,252,000*	*4,317,000*	*4,373,000*
Local Supplies					
Groundwater Production	1,530,000	1,540,000	1,560,000	1,550,000	1,540,000
Surface Production	220,000	210,000	210,000	210,000	210,000
Los Angeles Aqueduct	470,000	480,000	480,000	480,000	480,000
Seawater Desalination	-	-	40,000	70,000	70,000
Groundwater Recovery	120,000	120,000	120,000	120,000	120,000
Recycling	380,000	400,000	410,000	410,000	410,000
Other	7,000	7,000	7,000	7,000	7,000
Existing Local Supplies	*2,727,000*	*2,757,000*	*2,827,000*	*2,847,000*	*2,837,000*
CRA Supplies					
Basic Apportionment	550,000	550,000	550,000	550,000	550,000
Surplus	-	-	-	-	-
Salton Sea	-	-	-	-	-
IID-MWD Conservation	85,000	85,000	85,000	85,000	85,000
PVID Fallowing	120,000	120,000	120,000	120,000	120,000
IID-SDCWA Exchange	100,000	193,000	200,000	200,000	200,000
Canal Lining SDCWA	80,000	80,000	80,000	80,000	80,000
Canal Lining SLR	16,000	16,000	16,000	16,000	16,000
LCWSP	7,000	7,000	7,000	7,000	7,000
Quechan Settlement Agreement	13,000	13,000	13,000	13,000	13,000
SNWA Agreements	40,000	40,000	-	-	-
CVWD QSA Transfer	(35,000)	(35,000)	(35,000)	(35,000)	(35,000)
PPR's, 1,2,3b Ag etc.	(47,000)	(47,000)	(47,000)	(47,000)	(47,000)
Existing CRA Supplies	*929,000*	*1,022,000*	*989,000*	*989,000*	*989,000*
Existing SWP Supplies	80%	80%	80%	80%	80%
MWD Table A	1,529,000	1,529,000	1,529,000	1,529,000	1,529,000
DWCV Table A	156,000	156,000	156,000	156,000	156,000
Article 21	-	-	-	-	-
SBVMWD Minimum Purchase	20,000	20,000	20,000	20,000	20,000
Yuba River Accord Purchase	15,000	15,000	15,000	15,000	15,000
SWP Supplies with Current BO	*1,720,000*	*1,720,000*	*1,720,000*	*1,720,000*	*1,720,000*
Initial Gap	(1,285,000)	(1,292,000)	(1,284,000)	(1,239,000)	(1,173,000)

Wet-Year Gap

The wet-year gap shows that a very large amount of supplies may be available to put into storage programs. Under wet conditions, water demand is relatively low, and water supplies are expected to be at their highest levels. State Water Project supplies are estimated to be at 80 percent of Table A. This is a representative average of wet years based on the long-term CALSIM modeling study. The approximate probability of exceedence for this condition is 30 percent. The range of initial surplus supplies shown in the wet-year gap 1.2 MAF in 2010 to 1.1 MAF in 2035. As was the case with the normal-year analysis, even though quantities of surplus water are high, the frequency of occurrence and reductions due to restrictions in State Water Project supplies create water management challenges. As a point of reference, prior to the institution of the recent restrictions on supplies from the California Bay-Delta, hydrologic conditions occurring with the same probability of exceedence would have resulted in a 98 percent Table A allocation. This is an additional 400 TAF of surplus water supplies that could have been stored and managed under identical precipitation and hydrologic conditions.

Conclusions

The static gap analysis presented here shows that, under the current development of programs, Metropolitan's service area can expect to see a wide range of conditions that can result in high gaps between supply and demand in dry years. Varying amounts of surplus water for storage purposes may occur in normal and wet years, but the frequency of these conditions, and the quantities relative to the water supply and demand conditions that existed prior to the regulatory restrictions on the State Water Project, make effective water management through the use of Metropolitan storage challenging and difficult. The analysis provides some insight into the type of resource development needs that the region needs. Thoughtful investments in core supplies that work to maximize the water management capabilities of storage and flexible dry year resources developed through transfer purchases and agreements, are historically best suited to meet large dry year gaps combined with occurrences of surplus water supplies. It needs to be reiterated that this static gap analysis does not include a comprehensive view of additional uncertainties and impacts on the effectiveness of the existing storage programs. Further analysis using the Robust Decisionmaking Method will provide more complete information to help illuminate and determine the appropriate courses of action to take to manage future conditions.