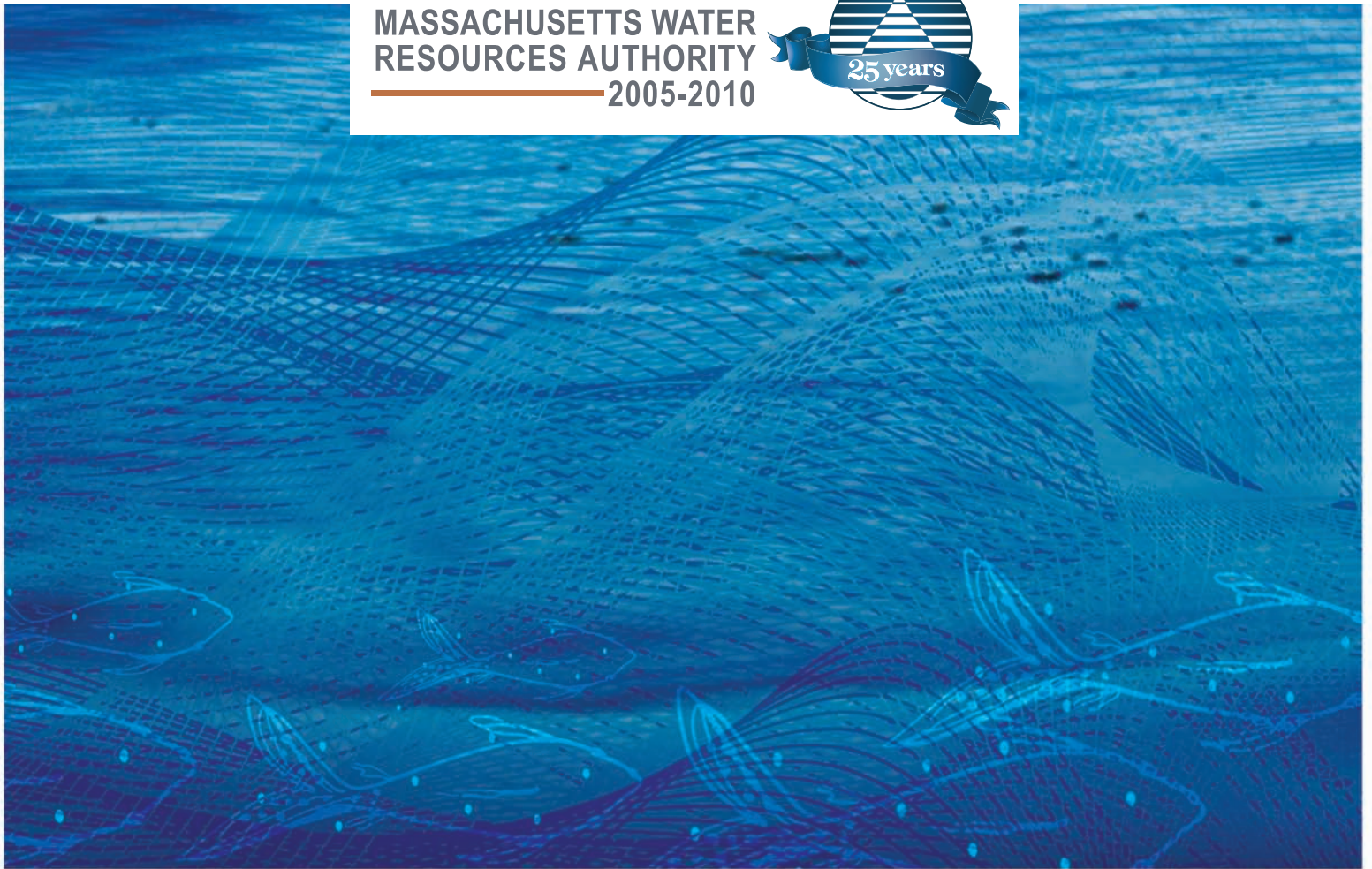




# 5 YEAR REPORT

MASSACHUSETTS WATER  
RESOURCES AUTHORITY  
2005-2010



# MWRA Board of Directors



LEFT TO  
RIGHT:

John Carroll  
Andrew Pappastergion  
Vincent Mannering  
Ian Bowles  
Michael Gove  
Marie Turner  
James Hunt  
Joel Barrera  
Frederick Laskey  
(MWRA Executive Director)  
John Walsh  
Joseph Foti  
Kevin Cotter

## **Ian A. Bowles, Chairman**

(appointed December 2006)

Secretary of Energy and Environmental Affairs. Mr. Bowles was previously the President and CEO of MassINC., a Boston-based research institute. (The Secretary serves as the Chairman of the Board.)

## **Joel A. Barrera**

(appointed December 2007)

Deputy Director of the Metropolitan Area Planning Council. For five years, he served at MAPC as legislative director and director of the Metro Mayors Coalition. (Appointed by Governor to represent the Merrimack River Watershed.)

## **John J. Carroll, Vice Chairman**

(appointed February 1985)

Town Manager of Norwood. He previously served as Superintendent of Public Works and Town Engineer for Lexington and from 1974 to 1978, Mr. Carroll was Commissioner of Public Works for Massachusetts. Member of the MWRA Advisory Board since 1985. (Appointed by the MWRA Advisory Board.)

## **Kevin L. Cotter**

(appointed August 2002)

Business Manager and Financial Secretary-Treasurer for the Plumbers and Gasfitters Local 12, Boston since 1997 and currently serves as Vice President of the Massachusetts AFL-CIO, and the Vice President of the Boston Building Trades Council. (Appointed by Mayor of the City of Boston.)

## **Joseph C. Foti, Secretary**

(appointed April 2001)

Director of Public Works for the City of Chelsea. Previously, Mr. Foti was Director of Operations for the City of Somerville's Department of Public Works for five years and Water Superintendent for nine years. Member of the MWRA Advisory Board since 1990. (Appointed by the MWRA Advisory Board.)

## **Michael S. Gove**

(appointed December 2007)

Attorney with Cooley Shrair of Springfield. Previously, Mr. Gove worked as the law clerk for the Western Division of the Massachusetts Housing Court and served as an associate commissioner to the Pioneer Valley Planning Commission between 2004 and 2007. (Appointed by Governor to represent the Connecticut River Watershed.)

## **James W. Hunt III**

(appointed April 2005)

Chief for Environmental and Energy Services for the City of Boston. Previously, Mr. Hunt served as Assistant Secretary for the Commonwealth's Executive Office of Environmental Affairs. (Appointed by Mayor of the City of Boston.)

## **Vincent G. Mannering**

(appointed June 1995)

Executive Director of the Boston Water & Sewer Commission. Previously, Mr. Mannering served in the Massachusetts House of Representatives, and was an Assistant District Attorney in Suffolk County. (Appointed by Mayor of the City of Boston.)

## **Andrew M. Pappastergion**

(appointed June 1997)

Commissioner of the Brookline Department of Public Works and member of the MWRA Advisory Board since 1985. (Appointed by the MWRA Advisory Board.)

## **Marie T. Turner**

(appointed December 1996)

Served as Chairman of the Winthrop Board of Selectmen, was a member of the Board for a number of years, and served in town government for over 35 years. (Appointed by Governor upon recommendation of the Board of Selectmen of the Town of Winthrop.)

## **John J. Walsh**

(appointed June 2009)

Lifelong Quincy resident and environmental community activist. Mr. Walsh has been Chairman of the Nut Island Citizens Advisory Committee since 1980. (Appointed by Governor upon recommendation of the Mayor of the City of Quincy.)



# Citizen Panel



LEFT TO RIGHT: Christine Kowalczuk, James Hoyte, Eileen Simonson, Joseph Del Greco INSET: Douglas Foy

## Joseph F. Del Greco

Mr. Del Greco served as MWRA's Assistant Director of Wastewater Operations until his retirement in 2007, after 38 years of dedicated service with the Metropolitan District Commission (MDC) and the Massachusetts Water Resources Authority. Mr. Del Greco began his career as an administrative assistant to the MDC Commissioner in 1969 where he worked his way up to Senior General Construction Inspector. When the MWRA was created in 1985, Mr. Del Greco transferred over to the new agency. During his tenure, Mr. Del Greco spearheaded a number of important initiatives, such as a community assistance program which helps MWRA's member communities with issues such as pipeline inspections and wet weather clean-up. He also created MWRA's confined space entry training program which serves MWRA staff, its member communities and various other agencies. Mr. Del Greco was active in the New England Water Environment Association, receiving numerous awards and publishing several papers.

## Douglas I. Foy

Mr. Foy is the President of Serrafix, a strategic consulting firm focused on environmental, energy, transportation and climate change issues. Prior to launching Serrafix in 2006, Mr. Foy served as the first Secretary of Commonwealth Development in the administration of Massachusetts Governor Mitt Romney, overseeing the agencies of Transportation, Housing, Environment, and Energy. He received the President's Environmental and Conservation Challenge Award, the country's highest conservation award, the Woodrow Wilson Award for Public Service and an honorary "Officer of the Order of the British Empire." An avid outdoorsman since his 1968 U.S. Olympic rowing team days, Mr. Foy enjoys the environment he's working to conserve.

## Christine L. Kowalczuk

Ms. Kowalczuk is a strategy consultant with extensive experience in managing multicultural client and consulting teams. Most recently, Ms. Kowalczuk spent a decade working for Corporate Value Associates in the US, UK, and Australia, where she led strategic business planning projects for multinational firms in the financial services, manufacturing, and communications industries. Ms. Kowalczuk was a Fulbright Scholar in Austria where she studied the politics of population redistribution in post WWI Europe. She was awarded an MBA from HEC School of Management in France and a MA in political science from the Fletcher School at Tufts University. Currently, Ms. Kowalczuk enjoys the challenge of raising two young sons and actively engaging in her community through volunteer leadership roles.

## Eileen R. Simonson

Ms. Simonson joined the Water Supply Citizens Advisory Committee (WSCAC) as a volunteer at its inception in 1978, becoming Co-Executive Director in 1982. She served as Executive Director of WSCAC for 26 years, retiring in 2008 and recently moving to Connecticut. After a decade of working against more river diversions to the Boston area water system, she presented WSCAC's positions for watershed protection and demand management, fighting the filtration requirement of the federal Safe Drinking Water Act for the MWRA system. Ms. Simonson contributed to the development and passage of state water policy, including emphasis on streamflow adequacy and drought planning, and new state laws including the Interbasin Transfer Act, Water Management Act and the Watershed Protection Act.

## James S. Hoyte

Mr. Hoyte is the retired Assistant to the President and Associate Vice President for Affirmative Action and Lecturer on Environmental Science and Public Policy at Harvard University. An attorney and specialist in public policy, from 1983 to 1988 Mr. Hoyte served as Massachusetts Secretary of Environmental Affairs with responsibility for the planning and management of all environmental and natural resource conservation policies and programs for the Commonwealth of Massachusetts. In that role, he also served as the first Chairman of the MWRA Board of Directors. He is founder of the Boston coalition Environmental Diversity Forum and Co-Creator and Instructor, with Dr. Nicky Sheats, of Harvard University's first course on environmental racism "Environmental Justice as a Policy Issue." He has published articles in the fields of environmental policy and management and serves on the boards of directors of numerous environmental and civic organizations.

# 5-Year Report Panel Letter

Honorable Deval L. Patrick, Governor  
Therese Murray, Senate President  
Robert A. DeLeo, Speaker of the House  
Steven C. Panagiotakas, Chairman, Senate Ways and Means Committee  
Charles A. Murphy, Chairman, House Ways and Means Committee

In taking stock of the Massachusetts Water Resources Authority (MWRA) over the past quarter century, a few facts stand out: the Authority has been highly successful in meeting its mandates, it has done this consistently and sustainably, and it has incurred enormous debt in achieving long overdue improvements. While these facts set the backdrop for examining the MWRA's past five years, we believe it is also important to look behind the scenes and emphasize the complexity of the MWRA, including its operations, responsibilities, and vast array of stakeholders affected by its activities.

MWRA's service model necessitates a high degree of collaboration and cooperation to operate successfully. The Authority is a wholesaler of water and/or sewer services to 60 member communities, using its extensive infrastructure of treatment plants, pump stations, tunnels and water/sewer pipe to deliver services. In turn, member communities maintain their own "retail" sewer and water systems that connect with the MWRA's as well as end-users' plumbing. Retail rates consist of the MWRA wholesale rate plus local service costs. In most communities, the end-consumer's bill consists of about 60% MWRA charges to 40% local charges.

MWRA inherited a severe sewer pollution problem and was mandated by the Federal District Court to fix it. Accordingly, in response to the Federal Court and in conjunction with the Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP), the Authority developed two large projects: The \$3.8 billion Boston Harbor Project (completed in 2002) and the \$876 million Combined Sewer Overflow (CSO) program. These projects have been shaped by many hours of negotiations, some lasting years, between the Authority, the Court, federal and state agencies, advocacy groups, and affected communities.

The MWRA water system is also complicated. MWRA does not own the land or water sources that it wholesales. It does, however, fund 100% of the state agency that manages the watersheds and controls public access, including the acquisition of new protective lands. Without a doubt, the political structure within which MWRA operates is challenging.

Reviewing the past five years, we wish to spotlight a fundamental MWRA responsibility that is all too often ignored until calamities happen, namely that of emergency manage-

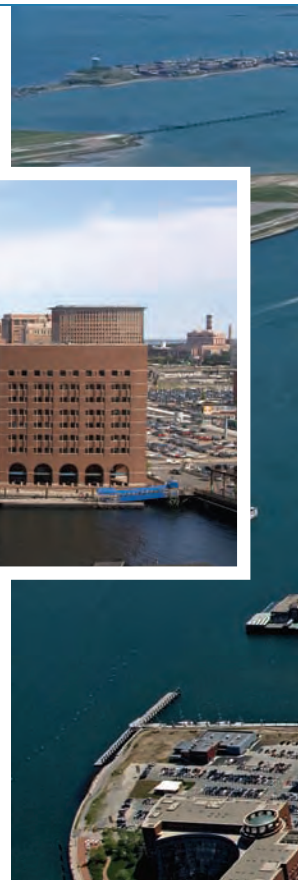


ment. As we write this letter in the spring of 2010, we have witnessed two major events within a three month period that have tested MWRA's ability to handle emergencies: the February/March 2010 floods and the May 2010 water pipe break. In both cases MWRA drew on its sound contingency planning and staff training to respond immediately and with decisive action, thereby minimizing negative consequences for the public.

Similarly, MWRA has revealed a financial steadfastness in the global financial and economic crises that hit in 2008 and are still being felt today. Thanks to diligent financial risk management, the Authority has been able to maintain favorable bond ratings and thus the ability to continue funding capital projects. We applaud MWRA's ability to mitigate emergencies of all kinds.

MWRA's core activity has also been impressive over the last five years. Today, about 75% of the CSO program has been completed, marking the final step in the clean-up of the Boston Harbor. Almost ten years since the start-up of the Deer Island outfall, water quality in Massachusetts and Cape Cod Bays remains high. The Charles River is fit for swimming. The public benefit of this clean-up has been tremendous, with the value of development along the Harbor alone approaching \$4 billion.

The \$2 billion water treatment program is almost complete as well, including a state-of-the-art water treatment plant that began operations in mid-2005 and uses ozone instead of chlorine for primary disinfection. At the same time, the MWRA has "led by example" in terms of implementing green energy projects and policies, saving well over \$1 million annually and generating more than \$114 million in revenue over the last five years through the sale of electricity during peak energy demand spikes. And the Authority continues to invest in source water protection through the purchase of 2,145 additional acres of land in the three watersheds since 2004.



A clean harbor  
has revitalized  
Boston's waterfront



All this has been accomplished through tight control of operating costs and an average rate increase of 4.7% for combined water and sewer charges over the last five years. Many believe this level of rate increase is too high. Looking forward, the current economic climate makes rates management even more challenging, given the lack of debt service assistance and the severe budget deficits facing communities and users.

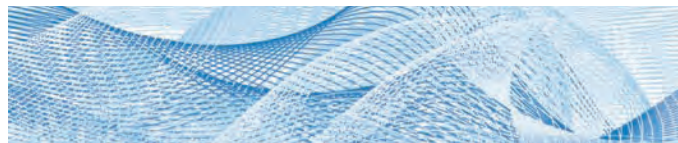
**C**ompounding this issue is a steady reduction in wholesale and retail water sales, largely due to successful water conservation. These same efforts have led to abundance in the water supply. MWRA would like to use this abundance and increase its water rate-base by adding new user communities. An additional benefit might be reduced stress on local rivers.

Lately there has been growing attention nationwide on aging water and sewer systems. The US Congress has taken note, and currently there is an effort to levy a per-bottle tax

on soda and bottled water to raise funds to help fix the infrastructure. While the future of this "Blumenauer Bill" is uncertain, federal stimulus money (ARRA) has been made available, and MWRA has been slated to receive over \$33 million in ARRA funding for a number of projects.

It will take more than federal stimulus money and a larger member rate base to meet MWRA financial needs. There are urgent rehabilitation projects for previously underinvested infrastructure. And as the May water pipe break made all too clear, water redundancy projects in parts of the transmission and distribution systems are not proceeding fast enough. The required project scale, as explained in the 2006 Master Plan, includes approximately \$2.1 billion for wastewater projects and \$1 billion for waterworks for the FY07-48 timeframe.

Financial and organizational issues add to the challenge. Current MWRA debt servicing is set to continue climbing until 2022, with 65% of FY20 operating expenses estimated to be spent on debt servicing (of which ~60% is sewer debt). At the same time, the Authority faces a significant overhaul of its workforce given the high average age of today's employees. Without careful succession planning, critical institutional memory and the ability to maintain operations at the current skill level is in jeopardy.



## LOOKING FORWARD, we would like to offer the following set of recommendations:

### MAINTAIN A TIGHT SHIP, BUT KEEP IT SOUND:

Previous Citizen Panels have consistently urged MWRA to continue to invest in maintenance despite increased pressure to curtail spending in less prosperous times. Current times are undoubtedly tighter than ever in MWRA's 25 years. Yet the consequences of inadequate investment are simply not an option, and MWRA must avoid another severe disruption, such as the May 2010 event. A comprehensive system risk assessment needs to be reviewed against the Authority's current Capital Improvement Program and Current Expense Budgets, with alterations made as needed. The Authority has already demonstrated a strong commitment to maintenance, and this should not be compromised.

Furthermore, construction of water redundancy improvements must be accelerated. We acknowledge that arguing for redundancy when budgets are already overstretched may appear extravagant; however, we believe it is fundamentally irresponsible for a system so vital to public health and safety not to have back-up alternatives.

We believe MWRA with Advisory Board guidance can achieve these goals without compromising its strong record of controlling costs, its commitment to low rate increases, or its demonstrated ability in emergency management.

### TAKE ADVANTAGE OF CURRENT TIMES:

Notwithstanding current economic hardships, we believe there is opportunity to invigorate MWRA's revenue model. The focus should be two-fold: first, gain public acceptance of the cost of necessary infrastructure maintenance and improvements; and second, press for assistance at both state and federal levels with help from the public. The public today largely takes MWRA services for granted. A dialogue that focuses on the extensive value provided by the Authority may help to adjust priority-setting in the public mind. Recent national press attention on the poor state of water/sewer infrastructure can help support the cause, as well as promoting a "give and take" approach where the MWRA highlights the low rate increase set for FY11 and reiterates that its systems are in better condition than most, but also stresses the importance of maintenance and redundancy as highlighted by the May 2010 event.

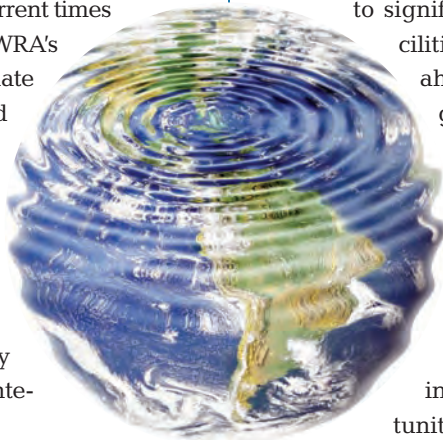
Additionally, MWRA must seek to create new sources of revenue. We commend the Authority's effective use of tech-

nology to deliver alternative revenue (e.g. through the sale of excess renewable energy) and urge it to explore further opportunities. Similarly, alternative financing mechanisms, such as public-private partnerships, may be worth investigation. Also, as noted earlier, MWRA would like to sell a portion of the water it has saved to needy new communities that qualify under law and regulation intended to manage the process.

### KEEPING EYES ON THE FUTURE:

Global warming and climate change have the potential to significantly affect MWRA service areas and facilities. We encourage MWRA to stay one step ahead and maintain its high level of emergency preparedness with regard to potential climate change impacts (e.g., higher levels of CSO due to more frequent and more intense storms, a significant rise in sea level, drought, etc.).

MWRA faces critical challenges in maintaining water and sewer infrastructures while also facing ever-growing debt servicing costs and limited revenue growth opportunities. We have presented our views on steps MWRA can take to continue to achieve its goals. We also believe the state has a role to play. It is time for the state to act again – this time in protection of the environmental and public health improvements achieved – and assist MWRA in achieving its mandates so that rate increases are kept to acceptable levels. Without outside assistance at this crucial juncture (such as reinstatement of the Commonwealth's rate relief program), we fear the value created by MWRA may be at risk.



Over twenty-five years ago, MWRA was established with the goal of ensuring quality water and sewer services that no longer polluted the environment. It is an honor to serve as the Citizen's Panel in this Silver Anniversary of the MWRA. We ask you to consider our recommendations and join us in supporting a successful future while we celebrate the Authority's extraordinary achievements.

  
JOSEPH F. DEL GRECO

  
CHRISTINE L. KOWALCZYK

  
DOUGLAS I. FOY

  
EILEEN R. SIMONSON

  
JAMES S. HOYTE



## a note from the EXECUTIVE DIRECTOR

**O**n behalf of the Board of Directors and staff, I am pleased to submit the MWRA's Five Year Progress Report prepared in accordance with Section 22(b) of Chapter 372 of the Acts of 1984.

This report coincides with the 25th anniversary of the MWRA. Established to clean up the dirtiest harbor in the country and to operate and update a great but long-neglected water system, the Authority has managed billions of dollars in capital projects to reverse the effects of decades of neglect in just one generation. The environmental and public health benefits of these projects are far-reaching and widely recognized.

Over the last five years, the agency has seen its share of challenges and accomplishments. While much of the focus has been on the program to control combined sewer overflows, like the massive storage tunnel mined along the beaches in South Boston and relief sewers in East Boston, we have also completed a new drinking water treatment plant in Marlborough and a new covered water storage facility at Blue Hills in Quincy.

Most recently, MWRA has faced operational challenges of extraordinary and historical proportions. The record setting rains and floods of March 2010 followed by the massive water break in May were very important reminders that there are 2.5 million people who depend on us to protect public health and safety. The exhaustive maintenance, training, and emergency preparedness programs that we have invested in across the agency have clearly paid off.

I would like to thank the members of the Citizen Panel for the time and attention that they invested in their review of this report and their valuable insights into what the Authority's focus should be over the next five years.

Finally, the MWRA's accomplishments would not be possible without the leadership and support of the members of the MWRA Board of Directors, past and present. They hold themselves and staff to equally high standards which set the tone and tenor of the entire agency.

**FREDERICK A. LASKEY**  
EXECUTIVE DIRECTOR

MWRA's senior  
management team



# Continued System Renewal

Over the last 25 years, the MWRA has invested \$7.1 billion on major capital projects rebuilding the region's aging water and wastewater infrastructure. The largest of these – the Boston Harbor clean-up and the modernization of the water system – have been successfully completed and are reversing the effects of previous decades of neglect.



A major focus over the last five years has been the ramping up of the Combined Sewer Overflow Control Plan. This \$876 million effort is the final part of the court-ordered clean-up of Boston Harbor and, when completed in 2015, will ensure that local rivers aren't turned into sewers during heavy rains and beach closings become a thing of the past.

Asset protection is another area requiring attention. Although many still think of the Deer Island Treatment Plant as "new," some parts of the plant have been in use for nearly 15 years now and require upgrades and retrofits. Many of the electrical and mechanical components are obsolete and require replacement.

With the completion of the John J. Carroll Water Treatment Plant in July 2005 and covered storage projects nearly finished, the focus has now turned to water pipeline rehabilitation and much-needed redundancy in parts of the drinking water transmission and distribution system.



## FINISHING THE BOSTON HARBOR CLEAN-UP: CONTROLLING COMBINED SEWER OVERFLOWS

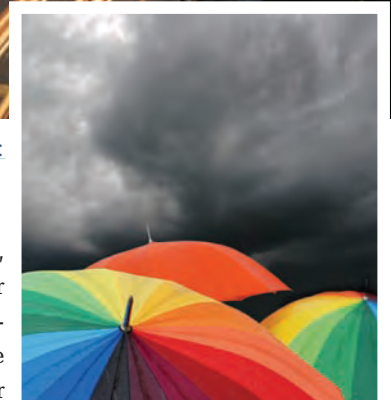
Combined pipe systems in Boston, Cambridge, Somerville and Chelsea carry both storm water and sewage flows together, rather than in separate pipes. Built-in outlets overflow into the nearest body of water. These combined sewer overflow (CSO) systems were originally designed this way so that storm water and sewage would overflow into local water bodies during heavy rains, instead of backing up into basements and city streets.

Since the completion of the Deer Island Wastewater Treatment Plant in 2001, MWRA has been focused on the control of CSOs during wet weather. The \$876 million program is about 75% complete and includes a number of strategies to eliminate or greatly reduce these discharges, including sewer separation, storage and enhanced treatment. These projects are mandated by the federal court.

As MWRA proceeded with implementation of the projects, the long-term plan went through several recommended adjustments and additions in response to regulatory inquiries seeking higher levels of control for the Charles River or to new information that raised concerns about construction requirements, cost or CSO control performance at North Dorchester Bay, Reserved Channel, East Boston, and Alewife Brook. A final, comprehensive long-term control plan was approved by EPA and DEP in March 2006 and accepted by the Federal Court in April 2006.

Currently, 24 of the 35 projects in the long-term plan have been completed and more than 2.5 billion gallons of annual CSO discharges have been eliminated.

When the plan is complete in December 2015, total annual CSO discharges in a typical rainfall year will be reduced to 0.4 million gallons (an 85% reduction from the 1988 level), and 93% of that remaining discharge will be treated at four MWRA screening and disinfection/dechlorination facilities.





### SOUTH BOSTON CSO STORAGE TUNNEL

After years of stalled negotiations, MWRA began design of the revised plan for North Dorchester Bay in August 2004. The new plan called for a larger diameter tunnel along the South Boston beaches, sized to provide storage of CSO flows up to the 25-year design storm and, together with a recommended storm drain along Morrissey Boulevard, provide a 5-year level of stormwater control for the beaches.

The tunnel will be dewatered with a 15 mgd pumping station located at Massport's Conley Terminal. At the upstream end of the tunnel, a building to provide tunnel ventilation is being constructed adjacent to a CSO outfall and the State Police building. When the project is completed in May 2011, South Boston will boast some of the cleanest urban beaches in the country.

Construction of the tunnel began in August 2006 and was completed in November 2009. The pump station and force mains were begun in May 2009; and the ventilation building contract was awarded in November 2009.

The Morrissey Boulevard storm drain (managed by the Boston Water and Sewer Commission and funded by MWRA) will allow large stormwater flows at outfall BOS087 to be re-directed away from the tunnel to Savin Hill Cove in storms greater than the one-year design storm, to further increase the level of stormwater control afforded by the project to the beaches and to dedicate the tunnel to CSO control in the largest storms. Construction was completed in July 2009.

On May 26, 2009, BWSC issued the Notice to Proceed for the first of nine planned construction contracts for the \$78.6 million Reserved Channel Sewer Separation project. The work of this contract includes the installation of 2.4 miles of new storm drain. BWSC's plans call for issuing notices to proceed for the remaining contracts through April 2013 and completing all work by December 2015. This project will minimize CSO discharges to the Reserved Channel and reduce the number of overflows to the Reserved Channel from as many as 37 to 3 in a typical year.

### EAST BOSTON SEWER RELIEF

The East Boston Sewer Relief project will relieve the interceptor system serving most of East Boston, minimizing CSO discharges to Boston Harbor and Chelsea Creek. Existing undersized sewers are being replaced using a combination of innovative and traditional construction methods including microtunneling, pipebursting and open cut.

The first rehabilitation contract began in March 2003 and was substantially completed in May 2004. The second, and largest, of the contracts involves the installation of 2.5 miles of new sewer interceptor primarily using microtunneling. Work began in July 2008 and 9,540 feet of sewer have been installed.

A third contract is for the installation of one mile of sewers using pipebursting – or pushing a new, smaller diameter pipe through an existing pipe. This contract was awarded in April 2009 and, to date, 2,500 feet of sewers have been installed.



The tunnel boring machine "holes-through" in South Boston

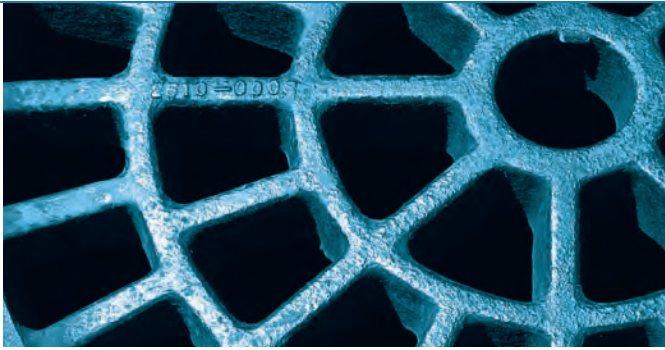
### SOUTH DORCHESTER BAY SEWER SEPARATION

The South Dorchester Bay Sewer Separation project, managed by BWSC, eliminated CSO discharges and provided a high level of stormwater control to greatly reduce beach closings along North Dorchester Bay in South Boston. The project, completed in 2007, included the installation of 25.7 miles of new storm drain to remove stormwater runoff from local sewers in Dorchester.



Judge Stearns checks the progress on the East Boston project





### STONY BROOK SEWER SEPARATION

The Boston Water and Sewer Commission completed the installation of 14 miles of new storm drains in 2006 to remove stormwater runoff from local sewers in Jamaica Plain, Mission Hill and Roxbury. This project was funded by MWRA.



### FORT POINT CHANNEL SEWER SEPARATION

The Fort Point Channel Sewer Separation project eliminated CSO discharges in a typical year from two outfalls. In March 2007, BWSC substantially completed construction of the project. BWSC installed 4,550 linear feet of new storm drain and completed weir raising and floatables controls.



### UNION PARK DETENTION/TREATMENT FACILITY

The Union Park Detention/Treatment facility improves water quality in the Fort Point Channel by providing treatment of CSO discharged from BWSC's Union Park Pumping Station. The existing pumping station, constructed in 1976, provides flood control for the South End neighborhood of Boston. The MWRA's detention/treatment facility was constructed adjacent to the existing pumping station, on property owned by BWSC at the intersections of Albany, Malden, and Union Park Streets in the South End. Flows pass through the new treatment facility before entering the pumping station wet well. Construction of the treatment facility commenced in March 2003 and was completed in April 2007.

### LITTLE MYSTIC CHANNEL STORAGE

The Little Mystic Channel storage conduit is located under the Tobin Bridge in Charlestown. It is comprised of two, parallel 10-foot by 17-foot conduits, each 280 feet in length, providing 670,000-gallons of off-line storage that capture CSO discharges at outfall BOS019 in Charlestown, from all but the two largest storms in a typical year. The project was completed in 2007, reduces CSO activations to the Little Mystic Channel from 18 to 2 times per year and reduces annual discharge volume from 8 million gallons to 0.4 million gallons. The new facility includes a small pump station to dewater the stored flows into the collection system (when available capacity in the local BWSC sewer system has returned after storms have passed).

### Reductions in CSO Discharges

Project	% CSO Reduction	Completed
Stony Brook Sewer Separation	99.70%	September 2006
South Dorchester Bay Sewer Separation	100%	December 2006
Fort Point Channel Sewer Separation	100%	March 2007
Union Park Detention/Treatment Facility	45.9% (100 Treated)	April 2007
Little Mystic Channel CSO Facility	86.40%	March 2007



## Additional CSO Control for the Charles River

### COTTAGE FARM BROOKLINE CONNECTION

In June 2009, MWRA completed the \$3.3 million Cottage Farm Brookline Connection project which reduces treated CSO discharges from the Cottage Farm CSO facility by diverting wet weather flows to MWRA's Ward Street Headworks, and then to Deer Island. This project utilized a previously unused 54-inch sewer constructed nearly 40 years ago.

### BROOKLINE SEWER SEPARATION

This project included two contracts to separate several areas of Brookline, totaling 72 acres, where there are remaining combined sewers tributary to MWRA's Charles River Valley Sewer. The project is intended to reduce discharges to the Charles River at the Cottage Farm facility. The first contract, substantially completed in November 2009, was valued at \$1.4 million and included the installation of 6,800 feet of storm drain. The larger, second contract is valued at \$22 million and was put out to bid in July 2010.

### BULFINCH TRIANGLE SEWER SEPARATION

This project, begun in September 2008, will separate the combined sewers in the area of Boston bounded by North Station, Haymarket Station, North Washington Street, and Cambridge Street. The project is intended to reduce discharges to the Charles River, reduce overflows to the Prison Point CSO facility and allow BWSC to permanently close the CSO outfall.

## Other Wastewater Projects

### BRAINTREE-WEYMOUTH RELIEF FACILITIES

The Braintree-Weymouth Relief Facilities Project has expanded and improved the network of sewer pump stations, interceptors and siphons that serves Braintree, Hingham, Holbrook, Randolph, Weymouth and parts of Quincy. This project was constructed under an Administrative Consent Order.

The \$237 million project included six construction contracts, all of which are now completed. The Intermediate Pump Station and sludge pumping facilities at Deer Island were completed in April 2005. The Fore River Siphons construction contract was completed in May 2005. Construction of the Replacement Pump Station was completed in April 2008.



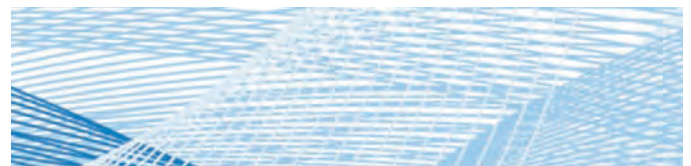
New Braintree-Weymouth Pump Station

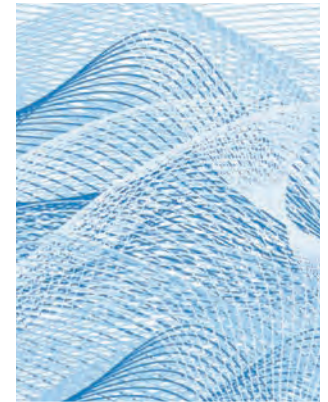
### UPPER NEPONSET VALLEY RELIEF SEWER

The project was designed to increase the hydraulic capacity in the 100-year-old Upper Neponset Valley Sewer by 8 millions gallon a day, through the construction of replacement sewers.

This project added 2.3 miles of new sewer lines running under VFW Parkway in West Roxbury.

The project has eliminated surcharging and overflows during the one-year, six-hour designated design storm, with no increase in downstream overflows. It also reduced overflows for 5-year and above storms. The project included two construction contracts; the first, awarded in March 2005 and completed in March 2008 and the second, awarded in October 2006 and completed in November 2007.





Began the rehab of 102 clarifier tanks at Deer Island

## DEER ISLAND ASSET PROTECTION

The Deer Island Wastewater Treatment Plant houses more than 60,000 pieces of equipment with an approximate value of \$1 billion. MWRA expects to sequentially replace equipment and structures in the facility as they reach the end of their useful life.

At an expansive and complex facility like Deer Island, unanticipated equipment and system failures have the potential to cause operational and maintenance crises. Asset protection programs help staff to anticipate when equipment systems and structures will near the end of their reliable service lives and to plan for their overhaul, upgrade, or replacement as needed. MWRA's Deer Island Asset Protection Program is broken down into five major categories:

- Equipment Replacement (chains, pumps, motors, control systems, discrete process equipment, etc.).
- Architectural projects (expansion joint replacements, concrete corrosion, etc.).
- Utility projects (water, sewer, drainage, piping, electrical wiring, heating systems, etc.).
- Support projects (Technical Information Center projects, security projects, etc.).
- Specialty projects (chemical pipelines and storage tanks, fuel storage tanks, etc.).

Over the last five years, 16 major-and countless minor-projects have been completed at a total cost of \$15.6 million. Highlights include:

- Equipment Condition Monitoring \$1.8 million: Installation of temperature and vibration-monitoring equipment in the North Main Pump Station and the Winthrop Terminal Facility. Work was completed in March 2005.

- Dystor Membrane Replacement \$640,000: Emergency replacement of a torn gas membrane on one of the digester storage tanks and preventive maintenance on the second. Work was completed in October 2005.
- Electrical Equipment Upgrade No. 2 \$1.9 million: Part of an ongoing replacement program for substation components and bus ducts at the end of their useful lives. Work was completed in February 2007.
- Heat Loop 1 & 2 (two projects) \$2.1 million: Rerouting of heat loop piping to within galleries in order to reduce corrosion associated with buried piping. Relocated piping also improves accessibility. Work was completed in February 2008.
- Pump Packing Replacement \$732,000: Replacement of pump packing seals with mechanical seals in the North Main, South System and Winthrop Terminal Pump Stations. Seals were purchased in June 2008 and work was completed by in-house staff.
- Hypochlorite Tank Relining (two projects) \$4.1 million: The project entailed the stripping and relining of Hypochlorite Storage Tanks 2 and 4. Ladders were also removed and safety railings on the tanks were replaced. Work was completed in October 2008.

## Improving Water Treatment and Reliability

### JOHN J. CARROLL WATER TREATMENT PLANT

Over the last five years, the Massachusetts Water Resources Authority has almost completed a \$2 billion program to improve the water system that serves 2.3 million people in eastern and central Massachusetts. This has included the 17.6-mile MetroWest Water Supply Tunnel and the 115-million gallon Norumbega Covered Storage tank in Weston. The last major construction project, a state-of-the-art water treatment plant in Marlborough that uses ozone instead of chlorine for primary disinfection, was completed in July 2005 and the transition to the new system was seamless.

Ozone is produced from pure oxygen and is a powerful disinfecting agent. It is bubbled through drinking water to destroy potentially harmful organisms and also to reduce unpleasant tastes and odors. With a peak capacity of 405 million gallons per day, the John J. Carroll Water Treatment Plant is one of the largest facilities in the country to use ozonation.

Carbon dioxide and sodium carbonate are added at the plant for corrosion control to prevent copper and lead from being released from home plumbing. Fluoride is also added to promote dental health.



Entrance to the Carroll Water Treatment Plant

The \$340 million plant is an investment by the ratepayers in 41 communities to ensure the safe and reliable delivery of the highest quality water to their taps. With the completion of the water treatment plant, the focus of work has shifted to upgrading pipes, pumps and other facilities.

### BLUE HILLS COVERED STORAGE

MWRA's long-term plan is to provide 320 million gallons of enclosed storage at various locations throughout the waterworks system. This quantity represents approximately one day of maximum demand.

The Blue Hills Reservoir, constructed in the 1950s, was removed from active service in 1981 due to contamination from birds and animals. The reservoir had been used as non-potable emergency supply. A new covered facility at Blue Hills equalizes water pressure during periods of peak de-



Blue Hill tanks before being covered by a meadow

mand and works in conjunction with surface mains and the Chestnut Hill emergency pump station to supply water to the Southern High service area in the event that the Dorchester Tunnel requires repairs.

Two 10-million-gallon buried drinking water storage tanks were brought on-line in August 2009 in the east end of the existing Blue Hills Reservoir. In addition, this facility will supply water to Quincy and Milton if the northern portion of Section 22 is shut down because of a break or for repairs. The remainder of the site will include a new fishing pond, upland meadow and hiking trails to be completed in Fall 2010.

### CHICOPEE VALLEY AQUEDUCT REDUNDANCY

The Chicopee Valley Aqueduct (CVA) supplies water to South Hadley Fire District No. 1, Chicopee, and Wilbraham directly from the Quabbin Reservoir.

The 5-mile long aqueduct was built in 1949 of reinforced concrete pipe with an embedded steel cylinder and was the only means of supplying these communities with water. To provide redundancy with building a completely parallel pipeline, MWRA designed and built more limited pipelines that allow each community to draw water from the new storage tanks in the event of a break. Only about 3 miles of smaller pipe were needed. The work included new fire tanker hook-ups within the three host communities of Ludlow, Ware, and



Belchertown, and two emergency mutual aid interconnections between the CVA system and the Springfield Water & Sewer Commission system in Ludlow. The project cost was \$6.5 million and work was completed in April 2008.

Automated controls at Wachusett Dam



### WACHUSETT DAM IMPROVEMENTS

Since taking over responsibility for the major dams in the waterworks system in 2004, MWRA immediately began to focus on deferred large capital and maintenance projects. First and foremost among the efforts was to re-start critical spillway improvements at the Wachusett Dam, initially designed in 1996 under an MDC contract, that had been put on hold by MDC due to fiscal constraints.

Improvements to the Wachusett Reservoir spillway included the installation of a hydraulically-operated crest gate, which was completed in November 2008. The \$5.3 million contract also included work at the Quabbin Reservoir, such as toe drain repairs at Windsor Dam, main spillway repairs, grouting of granite capstones and re-pointing of mortar joints.

In March 2007, when MWRA was preparing for the crest gate work, the consultant performed routine sampling of potentially hazardous building materials and discovered that the caulking at the top of the dam and the soil below contained reportable levels of PCBs.

Additional water samples were immediately collected from the reservoir. No PCBs were detected in this initial reservoir sampling nor in samples taken weekly during the removal project. Two contracts for the removal of PCBs at the Cosgrove Intake and Shaft A, and the top of the Wachusett Dam were completed in October 2008 and November 2008, respectively, at total cost of \$4.2 million. It is important to note that PCBs have never been detected in samples from the Wachusett Reservoir. A final contract to remove PCBs from the soil at the base of the dam will be completed in 2010.



### REHABILITATION OF 5 WATER PUMP STATIONS

MWRA's waterworks distribution system includes ten active pump stations. Five of them, Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street stations, are between 40 and 80 years old and are overdue for major rehabilitation. The Brattle Court Pump Station serves the towns of Arlington, Lexington, Waltham, and Winchester. The Reservoir Road Pump Station serves Brookline. The Hyde Park Pump Station serves Boston, Milton, Norwood, and Canton. The Belmont Pump Station serves Belmont, Arlington, and Watertown. The Spring Street Pump Station serves Lexington, Bedford, part of Waltham, Belmont, Arlington, and Winchester.

Some equipment at each pump station is inoperable, and system demand patterns have shifted during the life of the stations, requiring adjustments to pumping capacity. In addition,

station improvements have not kept pace with changes in building and safety codes. A \$22 million contract was awarded in October 2006 to upgrade these five facilities. The work is nearing completion.



### EAST AND WEST SPOT POND SUPPLY MAINS

The East and West Spot Pond Supply Mains serve the Northern Low Service Area, including portions of Brighton, East Boston, Charlestown, Chelsea, Malden, Medford, Somerville, and Everett. The lines are also designed to fully supply Cambridge during drought or emergency. The mains historically supplied Spot Pond and subsequently the James L. Gillis Pump Station. With the closure of Spot Pond as an active water supply source and the construction of the Spot Pond Suction Main as the primary supply to the Gillis Pump Station, the Spot Pond Supply Mains now serve as distribution mains to the eight communities and provide emergency backup supply to the Gillis Pump Station.

The East Spot Pond Supply Main consists of over 11 miles of mostly 48-inch diameter pipeline which passes through Brookline, Boston, Cambridge, Somerville, Medford, Malden, Melrose, and Stoneham. The West Spot Pond Supply Main consists of over 10 miles of 48-inch and 60-inch diameter pipeline that passes through Brookline, Boston, Cambridge, Somerville, Medford, and Stoneham. The \$63 million project was complete in May 2008. Water lines from Weston to Stoneham have been rehabilitated, cleaned, lined, replaced or upgraded as needed, improving water quality and reliability.

## SOUTHERN SPINE DISTRIBUTION MAINS

The Southern Spine Distribution Mains serve the Southern High and Southern Extra High System communities of Boston, Brookline, Milton, Quincy, Norwood, and Canton. Several of these pipelines have been functioning at approximately 50% of their original carrying capacity due to the build up of rust deposits and other matter along the pipeline walls. In their present condition, these mains could not provide adequate service to users if the Dorchester Tunnel was taken off-line.

This project includes five construction contracts. The first two contracts for Section 22 South were completed by June 2005. The third involved the installation of 4,500 linear feet of 48-inch ductile iron pipe and appurtenances along with two 48-inch control valves. The \$6.2 million project was completed in January 2009. Work has begun on the fourth contract.

## LONG-TERM REDUNDANCY

The 2006 Master Plan recommended a series of studies to evaluate cost effective approaches to provide redundancy to the entire metropolitan area as well as individual service zones. Redundancy will allow inspection and repairs to facilities such as Shaft 7 at Chestnut Hill, with its 60-year old valves and piping, and provide service in an emergency.

MWRA's Long-Term Redundancy project includes the study, permitting, design and construction phases of redundancy improvements to critical elements of the water transmission system. Currently, the project is in the study phase which includes the evaluation of alternatives, conceptual design and cost estimates to provide redundancy for both the Cosgrove Tunnel and for the metropolitan tunnel system.

For the western portion of the transmission system, the study has identified the construction of a new emergency pump station as the most cost effective means to provide redundancy for a raw water supply to the John J. Carroll Water Treatment Plant and to support the shut-down and repair of the Cosgrove Tunnel. For the metropolitan tunnel system, the study has evaluated a range of alternatives to provide redundancy in the event of a tunnel failure or a failure at any of the surface connections to the distribution system. Short-



listed alternatives include a phased program of surface pipe projects which can be implemented over a period of years.

In June 2010, a preliminary recommendation for a group of improvements to cost-effectively provide redundancy for the metropolitan system by building on the strengths of the existing infrastructure was presented to the Board of Directors. Design and construction funds were included in the CIP as a placeholder while the concepts are refined.

As part of the review process after the May 1, 2010 water main break, MWRA carefully reassessed the schedule for the rehabilitation of the Hultman Aqueduct. The MetroWest Water Supply Tunnel was built to provide redundancy to the then 60-year old Hultman, but the system will not actually have the redundancy until the Hultman is inspected and repaired and all of the interconnections are completed. The Board of Directors has since approved additional work hours which will allow the project to be completed 16 months earlier, by September 2013.





# Clean Water: From Quabbin To Massachusetts Bay

In order to ensure that all state and federal regulations are met and that public health and the natural environment are protected, MWRA constantly monitors the quality of both the drinking water and the wastewater released into the environment after treatment. When the new water treatment plant was completed in 2005, drinking water quality showed immediate improvements.

The same is true for wastewater: as each component of the Deer Island plant came on-line, Boston Harbor began to heal – and with each year, water quality gets better and better. Over the last five years, that trend has continued as projects to control combined sewer overflows have been completed and the harbor and its tributaries continue their recovery.

## DRINKING WATER QUALITY

Since July 2005, greater Boston's drinking water is treated at the John J. Carroll Water Treatment Plant in Marlborough. The first treatment step is disinfection of reservoir water. MWRA's licensed treatment operators carefully add measured doses of ozone gas bubbles to the water to kill any pathogens (germs) that may be present in the water.

Next, the water chemistry is adjusted to reduce corrosion of lead and copper from home plumbing. Fluoride is then added to reduce cavities. Last, chloramine is added--a mild and long-lasting disinfectant combining chlorine and ammonia--which protects the water while it is in the local pipelines. This treatment allows MWRA to meet current and tougher future state and federal water quality standards.

Ozone consists of three atoms of oxygen. It is created by applying an electrical current to pure oxygen in a specially designed chamber. Ozone provides better disinfection than chlorine alone, especially against *Cryptosporidium* and other hard to kill germs. It also reduces the amount of potentially harmful chlorine byproducts.

## WATERSHED PROTECTION

MWRA's water supply is protected by 240,000 acres of watershed lands. Source waters at the Quabbin and Wachusett Reservoirs continue to be well protected. MWRA is one of the few water systems in the nation with surface water supplies that are so well protected and of such high quality that EPA regulations do not require the added treatment step of filtration. Over 85% of the watersheds are covered in forest and over 75% of the land is protected from development.

The Watershed Protection Act (WsPA) regulates land use and activities within critical areas of the Quabbin Reservoir, Ware River and Wachusett Reservoir watersheds for the purpose of protecting the quality of drinking water. Since the passage of WsPA in 1992, watershed lands had been purchased by the Commonwealth through its bond proceeds. MWRA was then billed for and, over the years, paid increasing percentages of the debt service on those bonds, eventually reaching 100% of the debt service. MWRA also makes Payments In Lieu of Taxes (PILOT) to each watershed community for the land owned for water supply protection. Under the revised Memorandum of Understanding between MWRA and the Department of Conservation and Recreation (DCR), executed in April 2004, MWRA utilizes its own bond issuances for the purpose of acquiring land, in the name of the Commonwealth.

Over the last five years, MWRA has purchased 2,145 acres of land in the three watersheds at a cost of \$12.5 million. Since 1985, a total of 22,015 acres have been acquired for the purpose of watershed protection.





L-R: William Meehan, Katherine Dunphy, Judith Eiseman, Kathy Baskin (Secretary Bowles' designee), and Fred Laskey



### Water Supply Protection Trust

A water supply protection trust was created by Chapter 149 of the Acts of 2004 to provide a more efficient mechanism for MWRA's funding of the Office of Watershed Management, under the Department of Conservation and Recreation.

The Water Supply Protection Trust has a five person board of trustees responsible for approving the Office of Watershed Management's annual work plan and budget each spring for the following fiscal year beginning in July.

The members of the Board of Trustees are:

Ian A. Bowles, Secretary of Energy and Environmental Affairs

Fred Laskey, Executive Director of the MWRA

William Meehan, representative jointly selected by the North Worcester County Quabbin Anglers Association, Inc. and the Quabbin Fishermen's Association, Inc.

Judith Eiseman, representative from the Swift River Valley Historical Society

Katherine Haynes Dunphy, Chairwoman of the MWRA Advisory Board

### NO PHARMACEUTICALS IN THE WATER SUPPLY

In March 2008, the Associated Press broke a story about traces of pharmaceuticals found in some of the nation's water supplies. The AP reporters compiled the results of tests from various water systems around the country and identified 36 pharmaceutical compounds. These compounds are not regulated by the EPA and water suppliers do not normally test for them.

MWRA did not expect to find any in the water supplied to 50 communities in eastern and central Massachusetts because the source reservoirs are so well protected and because the ozone treatment provided at the Carroll Water Treatment Plant would be effective at destroying many of them if they were present.

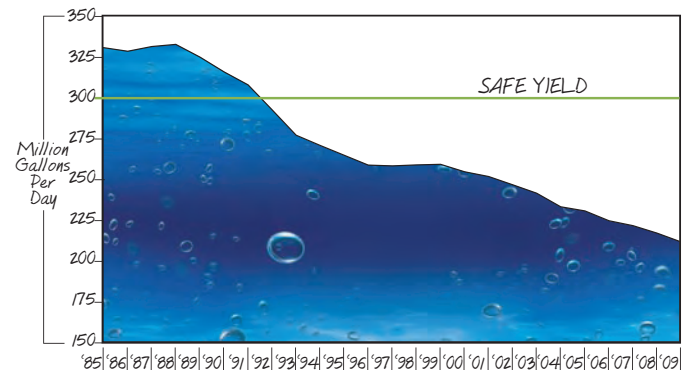
But, just to be sure, MWRA did test, and the results confirmed that there are no traces of pharmaceuticals, hormones or potential endocrine disrupting compounds in the water delivered to customers in the MWRA service area.

### REDUCING THE RISK OF LEAD IN TAP WATER

Since MWRA began adjusting the pH of its drinking water in 1992 to make it less corrosive, lead levels measured at customers' taps have continued to decline. The MWRA system has been below the Action Level for the last 13 consecutive rounds of testing.

### WATER DEMAND STILL DECREASING

Due in large part to water conservation efforts and leak repairs, the amount of water used for water supply has decreased over time, releases from MWRA's reservoirs have increased, and flows in the Swift, Ware and Nashua Rivers have increased. Usage in the MWRA service area has decreased by over 100 million gallons a day since the late 1980s and that trend continued through 2009, with total usage dropping to 206 mgd - a 14 mgd drop from the previous year.



### WATER MANAGEMENT ACT REGISTRATION

One of the major policy issues facing the agency in 2008 was the 10-year renewal of its Water Management Act registrations, which allow MWRA to withdraw water from the Quabbin and Wachusett Reservoirs. In the extensive negotiations with DEP, MWRA insisted on achieving three goals:

- That the current 312 mgd allowable withdrawal not be reduced;
- That the MWRA system be treated as a whole rather than expose individual communities to onerous conditions;
- That MWRA communities not be required to impose summer use restrictions unless the Quabbin Reservoir is actually at critically low elevations.

The registrations satisfy each of these important objectives, and represent a reasonable middle ground position for DEP. Throughout the negotiations, and even as late as December, DEP staff raised the possibility of reducing the 312 mgd to the current use. MWRA staff maintained that this would be objectionable, and MWRA's position prevailed.

### ADDING NEW WATER COMMUNITIESS

While water use continues to decline, four communities have joined the MWRA water system over the past five years – Dedham and Westwood in 2005, Reading as a partial user in 2005 and a fully supplied community in 2007, and Wilmington in 2009.



### THE HARBOR'S RECOVERY AND THE BAY'S CONTINUED HEALTH

Wastewater management protects the environment through pollution prevention, which minimizes the contaminants entering the waste stream; effective treatment which removes pollutants before discharge; and effective dilution to ensure that water quality criteria are met. MWRA is required to perform thousands of tests every year to monitor the effectiveness of treatment and to ensure that effluent (the wastewater that is discharged through the MWRA outfall) meets

water quality standards.

MWRA's Toxic Reduction and Control program has dramatically reduced toxic contaminants entering the plant.

Secondary treatment at the Deer Island Wastewater Treatment Plant removes solids, organic matter, and contaminants. For most constituents, like metals, actual effluent quality is significantly better than was predicted during planning and permitting for the plant. The effluent meets stringent permit limits that protect marine life.

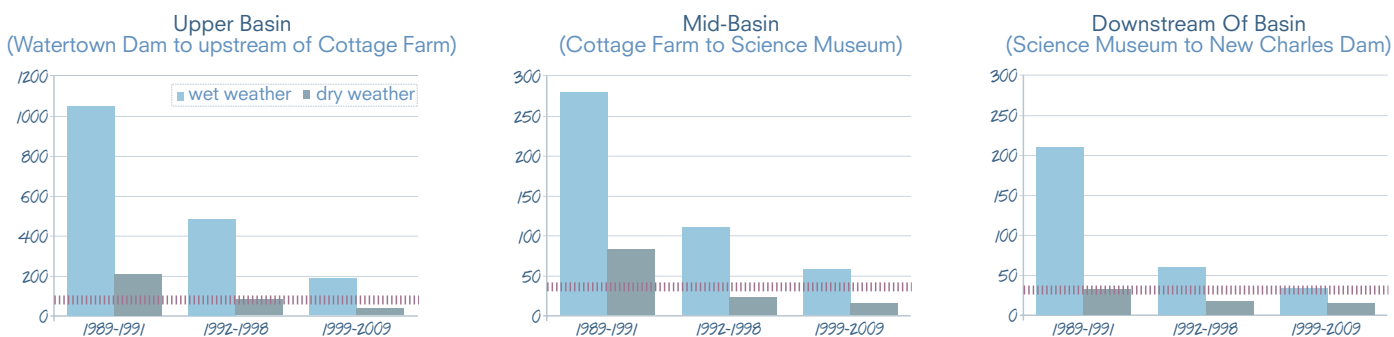
The outfall-diffuser system in Massachusetts Bay rapidly dilutes the treated effluent in seawater so that nitrogen remaining in the discharge quickly reaches the normal oceanic background level.

### TRIBUTARY RIVERS

Combined sewer overflow and stormwater projects in the Charles River continue to be reflected in water quality improvements, especially between the Watertown Dam and the BU Bridge—60% of samples in this part of the river meet bacteria standards during the past 5 years compared to 40% in the previous 5 years. Downstream of the BU Bridge, 70-80% of samples meet bacteria standards. The river is visibly cleaner with sewage-related floatables now a rare sight. Earlier projects eliminated CSO in the Neponset River, improving wet weather water quality, and projects in the Alewife Brook will control CSO there.

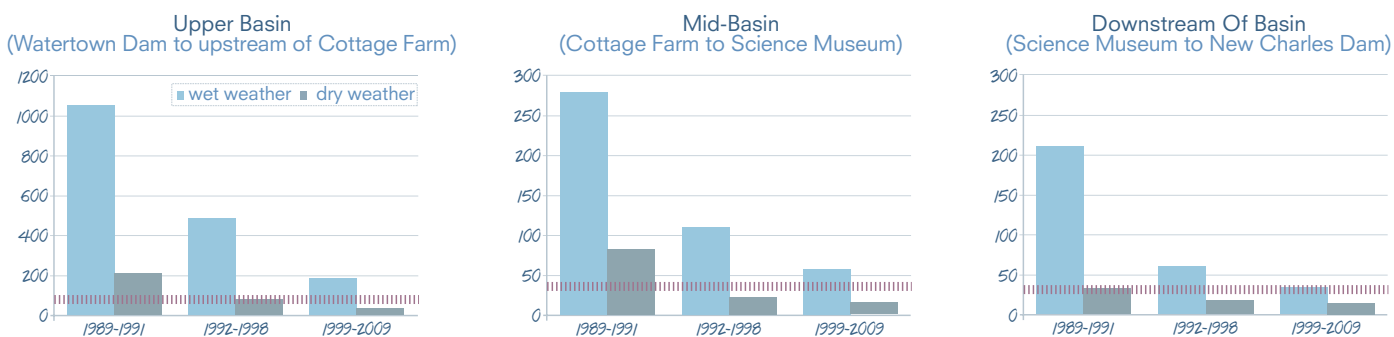
### Change In Lower Charles River Water Quality Over Time

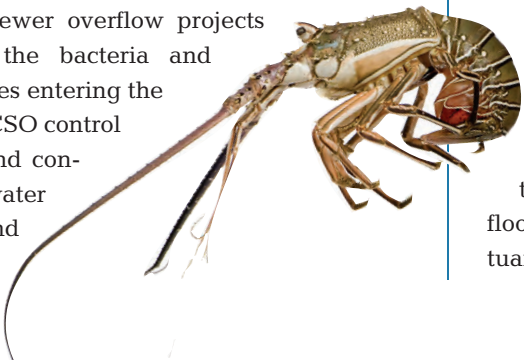
Enterococcus bacteria counts, 1990-2009 (note change in scale)



### Change In Lower Charles River Water Quality Over Time

Enterococcus bacteria counts, 1990-2009 (note change in scale)





**BOSTON HARBOR**

Boston Harbor's remarkable recovery is recognized worldwide as an environmental success story. Water quality (clarity, bacterial contamination) improved immediately with the cessation of sludge discharges in 1991. Over the next decade, the harbor's ecosystem responded as each major project milestone (improved primary treatment, secondary treatment, and the long outfall) came on-line. Liver disease in flounder in Boston Harbor has dropped dramatically, oxygen levels in bottom waters have increased, and Enterococcus bacteria levels have dropped. There is a greater diversity of animals living in the harbor sediments. Meanwhile, the combined sewer overflow projects dramatically reduced the bacteria and sewage-related floatables entering the harbor. The long-term CSO control projects are ongoing and continue to improve the water quality in the harbor and its tributary rivers.

**MASSACHUSETTS AND CAPE COD BAY**

Researchers extensively test Massachusetts Bay and Cape Cod Bay water, plankton, sediment, fish and shellfish, and animal communities to ensure that MWRA's treated effluent does not adversely impact the ocean or its inhabitants.

Data collected by ship, monitoring buoy, and satellite are all used to understand the changes in the ecosystem that occur through different seasons and years. The data are also incorporated into an advanced computer model of the water quality in the bays. The evidence is that discharges through the MWRA outfall have had no adverse impacts on the waters or marine life of Massachusetts and Cape Cod Bays or Stellwagen Bank National Marine Sanctuary.

On the rocks near the outfall, abundant communities that include sea anemones, sponges, kelp, lobster, and rock crab, are thriving. Cod and other fish even swim in the waters near the diffuser. Normal communities of worms, arthropods, and mollusks live on the sea floor near the outfall. Whales continue to frequent the sanctuaries in Cape Cod Bay and Stellwagen Bank as ever.

# Sustainable Operations

It's one thing to build new treatment facilities and infrastructure, it's quite another to keep them up and running. MWRA has an aggressive maintenance program to protect the investments it has made and ensure that these facilities are up and running and in good condition at all times.

MWRA strives to operate all of its water, wastewater and administrative facilities in an energy efficient and environmentally sound manner. MWRA has added wind and solar power at its Deer Island Treatment Plant and has additional installations underway. MWRA has aggressively pursued funding opportunities, such as the American Recovery and Reinvestment Act, and is committed to continuing to take advantage of new technologies to reduce energy demand, keep costs down, and reduce the agency's carbon footprint.

## Green Energy Projects

In keeping with Governor Patrick's goals for Massachusetts, MWRA has continued to work aggressively to use its resources efficiently, respond appropriately to climate change, and reduce the environmental impacts of its daily operations. Efforts to implement sustainable and energy efficient practices throughout the agency are ongoing.

The largest concentration of these efforts has been at the Deer Island Wastewater Treatment Plant, as it is by far MWRA's largest energy using location. Deer Island currently self-generates 22% of its electricity needs and more than half of the Island's energy demand is provided by on-site, renewable generation.

In addition to new initiatives, long-standing practices continue, such as the capture of methane from the digesters which is used in Deer Island's on-site power plant to create steam that supplies hot water and heat



MWRA's first wind turbines at Deer Island

for the facility. The steam is also run through a steam turbine generator that produces electricity. This co-generation facility saves MWRA approximately \$15 million in annual fuel oil costs. Since 2002, energy is recovered by the flow of treated wastewater as it drops from the plant into the outfall tunnel shaft through two one-megawatt hydroelectric generators that produce over 5 million kW hours of electricity, avoiding approximately \$500,000 in energy costs annually.

Over the last five years, several new projects have been completed:

- A design/build contract was awarded in October 2008 for the installation of two 190-foot wind turbines (600 kW each) at Deer Island. The wind turbines generate over 2 million kW hours per year for an annual estimated savings of \$230,000. The turbines were installed and operational by November 2009.
- A 100-kW roof-mounted solar photovoltaic system was installed on the Residual/Odor Control Building at Deer Island in early 2008. All power generated is being utilized on-site. The \$870,000 solar photovoltaic project was funded by a \$310,000 CREB loan and a grant of \$560,000 from the Division of Energy Resources. The solar installation will be qualified as a Massachusetts Renewable Portfolio Standards Program (RPS) renewable generation unit and MWRA can sell the Renewable Energy Certificates for solar as it currently does for digester gas, further reducing energy costs.
- A second, 180-kW roof-mounted solar photovoltaic system was installed on the Deer Island Maintenance/Warehouse building in early 2010 and is now operational.
- Electrical upgrades are ongoing at the two pump stations to replace the variable frequency drives that power the eighteen 1,250 horsepower motors with more energy efficient technology. Work at the South System Pump Station was completed in August 2007, resulting in an annual reduction of electricity pur-

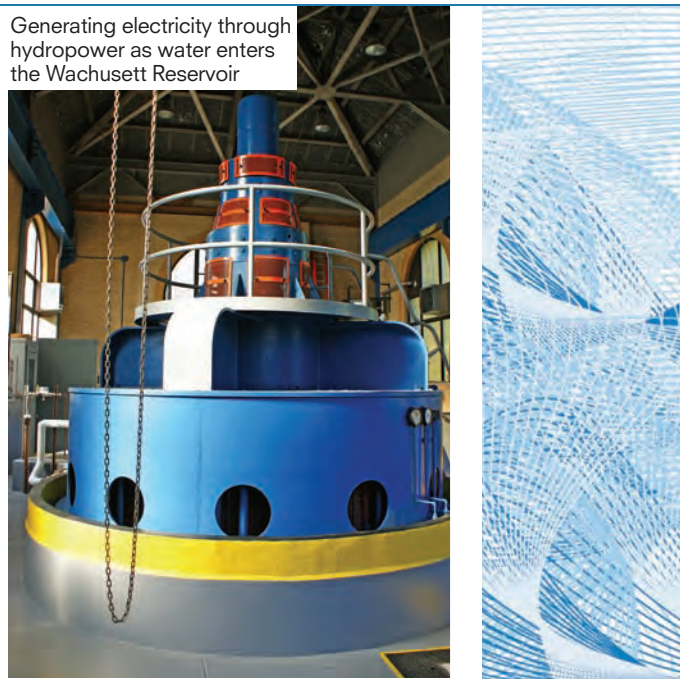


Completion of first solar array at Deer Island

chases of \$130,000 plus a rebate of \$209,000.

- Through NStar, Deer Island recently completed three phases of a multi-phase lighting improvement program aimed at replacing existing lamps and ballasts with high performance fluorescent reduced wattage fixtures, integrated day lighting, occupancy controls, and replacement of "Exit" signs with LED technology.
- MWRA has accelerated a project to modify the steam cogeneration system and optimize use of the digester gas by installing a back pressure turbine at the Thermal/Power Plant. The modifications are expected to significantly increase renewable energy production by 5.5 million kW hours per year with a net savings of approximately \$500,000 per year. Renewable energy projects are also underway at other MWRA facilities.
- At the Carroll Water Treatment Plant, a contract was awarded for the installation of 496 kW ground-mounted solar photovoltaic system in December 2009. This system will provide about 5% of the electrical demand of the facility. Work is ongoing.

Generating electricity through hydropower as water enters the Wachusett Reservoir



- At the Loring Road Covered Storage Facility in Weston, a contract was awarded for the installation of a 200 kW hydroelectric generator in December 2009. About 25% of the power provided by this generator will be used on-site and the remainder will be sold back to the grid. This supplements the much larger hydrogenerators already in place at the end of the Quabbin Tunnel and the beginning of the Cosgrove Tunnel. These two green power generators produce the equivalent of about half of the energy used by the entire water system.
- In Charlestown, a contract was awarded for the installation of a 1.5 MW wind turbine at the DeLauri Pump Station in December 2009. About 20% of the energy will be used on-site and the rest net-metered to other MWRA accounts. These three projects are being funded through the Green Infrastructure portion of the American Recovery and Reinvestment Act (ARRA), administered through the State Revolving Fund. More information on ARRA funding is provided in the next chapter.

In recognition of these efforts, MWRA received the Commonwealth's "Leading By Example Innovation Award" in October 2007.

#### GENERATING REVENUE WITH RENEWABLE ENERGY

Both the Deer Island and Carroll Treatment Plants are enrolled in the ISO-New England Demand Response Program. Through this program, MWRA receives capacity payments for having demand resources ready to respond during peak energy demand spikes, when supply shortages are likely. MWRA also sells electricity produced from the Deer Island steam turbine, and two hydroelectric facilities located where drinking water enters and leaves the Wachusett Reservoir. Over the last five years, these programs have generated a total of \$14.4 million in revenue.

## Putting It To The Test

The Spring of 2010 presented the MWRA with two major events that would test the limits of the water and sewer systems, as well as the staff itself.



DURING THE ENTIRE MONTH OF MARCH, the MWRA's service area received record rainfalls – over 20 inches – which caused massive flooding throughout the region. The volume of water severely taxed the sewer system day after day.

Two controlled releases had to be made through the Nut Island emergency outfall to prevent flooding of the facility and prevent sewer overflows into residential neighborhoods, releasing about 8 million gallons of untreated wastewater into Quincy Bay. The brief releases also prevented a potential facility shut-down that would have required months of work and cost several million dollars to ratepayers.

During the storms, all of MWRA's sewage facilities performed as designed and MWRA's Deer Island Treatment Plant processed record flow amounts.

On May 1st, a break occurred on a 10-foot diameter water main in Weston that connects two major transmission lines – the MetroWest Water Supply Tunnel and the City Tunnel. While crews raced to stop the leak and repair the pipe, emergency response plans were used to activate the Sudbury Aqueduct and Chestnut Hill Reservoir Emergency Pump Station. Use of the emergency water system also triggered a precautionary “boil water order” for 2 million residents in the 30 communities that were affected.

The magnitude of the incident was quickly apparent and, with the help of Governor Patrick and Boston Mayor Menino, a number of state and city agencies mobilized to aid in the response, ranging from getting the word out to all residents to arranging for the delivery of potable water to communities.

Fortunately, the leak was repaired quickly and, after a marathon of collecting water samples by community water workers, the system was back to normal in less than 72 hours.

Although both incidents were unprecedented in the agency's 25-year history, staff were prepared to respond and the facilities required were in good working order. These events served to underscore the importance of the day-to-day maintenance of all MWRA's facilities and continual staff training and drills.

## COMMITMENT TO MAINTENANCE

As MWRA's major capital initiatives wind down, maintenance expenditures to preserve these operating assets and maintain its infrastructure continue to grow. Despite continual trimming of the overall operating budget, the maintenance budget continues to grow each year, demonstrating MWRA's commitment to maintaining its core operation related facilities and infrastructure.

Since taking over operation and maintenance of the water and sewer systems from MDC, MWRA has increased annual investment in the system infrastructure from an average of \$11 million per year to an average of more than \$350 million per year. This investment has greatly improved the operating efficiency of the existing water and sewer systems and ensures that this critical infrastructure will never again fall into a cycle of disrepair.

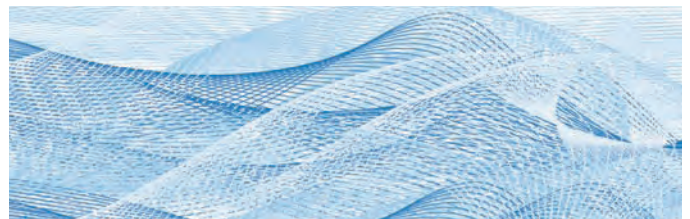
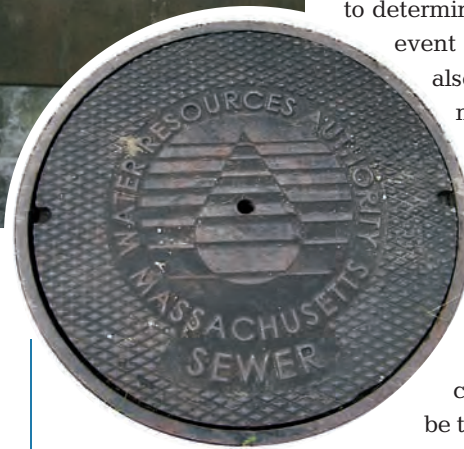
## BUILDING ON THE DEER ISLAND MAINTENANCE MODEL

MWRA's approach to maintenance and asset management has been to adopt industry “best practices” to make operations and maintenance improvements that will extend equipment and infrastructure life and protect the ratepayers' investment in these facilities. MWRA completed extensive benchmarking to determine the best practices to adopt from both outside and inside the water and wastewater sectors. An overall Facilities Asset Management Plan was implemented using task teams and extensive training and application of best practices. Deer Island was an early implementer of asset management and has been recognized for several years now as a national leader for employing high-level practices. One of MWRA's goals over the last five years was to commit additional resources to developing enhanced off-Island facility and equipment asset management programs. In June 2008, two senior vacant positions in the Field Operations Department were filled by highly experienced staff from Deer Island. In return, two senior managers from Field Operations joined the Deer Island team. This “cross-pollination” of staff will both ensure that maintenance at Deer Island stays on course and provide

Incident management at MWRA's emergency operations center



Checking out high flows at Deer Island



### EMERGENCY PLANNING

Since September 11, 2001, MWRA has made major investments to ensure the security of its critical water and sewer infrastructure. An agency-wide Security Task Force continues to meet regularly.

In 2006, emergency preparedness and physical hardening of facilities continued. However, a great deal of focus was placed on planning for specific emergencies, in light of Hurricanes Katrina and Rita, and of the emerging threat of an avian flu pandemic.

In the wake of the hurricanes, an Office of Emergency Preparedness reporting directly to the Executive Director was created to provide a more streamlined organizational structure with the ability to act quickly and decisively across departments in the event of an emergency. In addition, satellite Emergency Operations Centers (EOCs) have been established at both the Deer Island and Carroll Treatment Plants to ensure continuity of operations if the Chelsea EOC facility was lost or inaccessible.

With the potential outbreak of the H1N1 flu last year, MWRA began an exercise to update and run through existing pandemic plans. Staff created a new web-based tool to determine staff availability in the event of a pandemic. MWRA

also hosted a workshop for member communities to outline the plans put in place to ensure delivery of water and sewer services even if a large percentage of the workforce was out sick and to suggest measures the communities should also be taking.

cross-training among senior Operations staff as the workforce ages and long-term managers become eligible for retirement.

### MAXIMIZING AUTOMATION

MWRA utilizes an automated system to focus on predicting and preventing problems rather than fixing them once they occur, cutting in half the time crews spend on repairs. MWRA has increased its predictive maintenance compliance to 95 percent, beating the accepted industry benchmark of 90%.

Specialized software gives MWRA the ability to track the condition of more than 120,000 assets including water pumps, valves, collection pipes and electrical equipment. The software can also tap in to geospatial data to map the exact location of each asset while detailing its status, condition, cost and maintenance history.

Maintenance staff prioritize tasks, assign work based on the availability of necessary parts and labor, and analyze equipment failures in order to implement appropriate preventive maintenance measures. The software is used for work order management, planning and scheduling, asset management, resource management, recording of maintenance costs, and generation of reports and analysis.

These maintenance practices have spread from the Deer Island Treatment Plant to MWRA's Chelsea Maintenance Facility and the Carroll Water Treatment Plant in Marlborough.

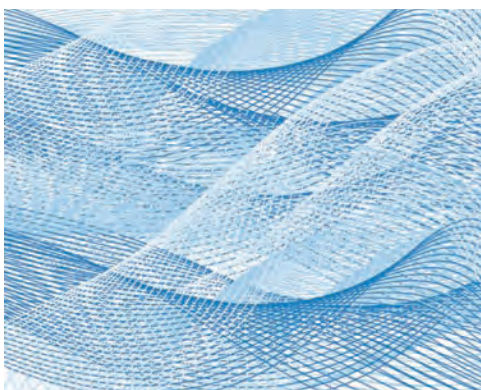


# Finance and Management

Each year, the MWRA Board of Directors must approve an annual operating budget and capital spending plan as well as community assessments adequate to cover all planned expenses. Each MWRA member community, in turn, establishes local water and sewer charges to support both the community's MWRA assessment and the cost of operating the local water distribution and wastewater collection system.

Nearly 80% of MWRA's massive construction program has been mandated by federal or state regulators and has left the agency with \$5.8 billion in bonded indebtedness. The debt service on those bonds currently accounts for 58% of MWRA's operating budget. This, coupled with the global financial crisis of recent years, has left MWRA with the daunting task of managing its finances without imposing an even heavier burden on its ratepayers.

MWRA is committed to finding ways to keep costs down and ensuring that every dollar spent provides real public health or environmental benefits.



## CAPITAL FINANCING

In order to finance its Capital Improvement Program, MWRA issues long-term revenue bonds. MWRA currently has \$5.85 billion in outstanding secured debt, including fixed-rate, variable-rate and low-and zero-interest State Revolving Fund (SRF) debt.

Capital financing expense today accounts for 58% of the Current Expense Budget, so MWRA must actively manage its debt structure to take advantage of favorable interest rates to moderate water and sewer rate increases. Tools used by the MWRA to lower borrowing costs and manage rates include maximizing the use of subsidized SRF debt, issuing variable rate debt, current and advanced refinancing of outstanding debt, and use of surplus revenues to defease debt.

Over the last five years, MWRA has taken advantage of favorable interest rates whenever possible to refinance debt for savings. Since 1992 MWRA has refunded \$4.3 billion of outstanding debt to achieve present values savings of approximately \$213.2 million.

### Refinancing for Savings

2005	MWRA sold \$504.5 million in bonds resulting in a present value savings of \$25.5 million over the next 30 years.
2006	MWRA sold \$486.3 million in new money and refunding bonds resulting in a present value savings of \$5.43 million.
2007	MWRA sold \$847.9 in new money and refunding bonds resulting in a present value savings of \$4.9 million.
2008	MWRA refunded \$1.3 billion to eliminate auction rate securities, and insured variable rate bonds, as well as achieve rate relief in target years 2009-2015.
2009	MWRA sold \$383.2 million in new money and refunding bonds for a present value savings of \$19.5 million.

## SURVIVING THE GLOBAL FINANCIAL CRISIS

In 2008, the fallout from the subprime mortgage crisis sent tremors through the financial markets. MWRA was insulated from most of the negative impacts with the exception of a modest portion of variable rate debt covered by bond insurance and auction rate securities. Two of MWRA's bond insurance companies were heavily involved in securities backed by subprime mortgages and, as a result, their credit ratings dropped causing investors to distance themselves from any exposure to these insurers. The downgrade of these bond insurers also caused variable rate bonds and auction rate securities' interest rates to climb. MWRA carefully monitored these events and, with the input of a subcommittee of the Board and Board approval, initiated a number of strategic interim and long-term solutions to address the impact on its variable rate debt portfolio:

- Issued a Request For Proposals (RFP) for liquidity and letter of credit bids at the very onset of the market dislocation. As a result, MWRA procured sufficient liquidity, at competitive rates, to cover its variable rate portfolio before the liquidity market reached its offering capacity. In order to insulate the Authority from termination based on insurance downgrades, MWRA



negotiated with its liquidity providers to amend existing Standby Bond Purchase Agreements to allow for termination only in the event that both MWRA's and the bond insurers' credit ratings are downgraded below investment grade by all three rating agencies.

- Ultimately, MWRA was able to refinance \$1.3 billion of outstanding insured variable rate demand bonds and auction rate securities which dramatically reduced MWRA's interest rates and returned its trading values to normal market levels.

MWRA was also able to manage through the impacts of the September 2008 bankruptcy filing by Lehman Brothers. MWRA acted quickly to find new banks to remarket two series of its variable rate debt portfolio which had been managed by Lehman. Since MWRA had just completed a recent procurement of Remarketing Agents, it was able to expedite the transfer of those bonds to new remarketing agents without any interruption to the bond holders. In addition to the remarketing agreement, MWRA had two swap agreements from 2000 with Lehman Brothers' subsidiaries which needed to be replaced. MWRA moved quickly to issue a RFP and accept bids to replace Lehman Brothers and avoid termination payments. As a result of the Authority's swift action, it was able to secure new counterparties which allowed it to diversify its exposure to any one bank and resulted in a net favorable gain for the Authority and its ratepayers.

Throughout the course of the world-wide economic crisis, MWRA has remained a strong credit in the municipal market place, which has allowed it to issue the debt necessary to fund its capital programs and even to refund outstanding debt at lower rates for a present value savings of \$19.5 million in 2009.

### MAINTAINING FAVORABLE BOND RATINGS

Over the last five years, MWRA's credit ratings have remained favorable. In March 2005, both Fitch Ratings and Moody's Investor Services raised MWRA's ratings to AA from AA- and Moody's raised its rating to Aa2 from Aa3. In addition, Standard and Poor's reaffirmed the MWRA's rating of AA stable.

In 2009, MWRA secured a credit rating upgrade from Standard and Poor's to AA+ from AA during a chaotic credit market. Ratings from Moody's Investor Service and Fitch Ratings were affirmed at Aa2 and AA, respectively.

According to Fitch, "The 'AA' rating is based on MWRA's sound financial operations and operating track record." Adding that, "Effective financial management is demonstrated by the Authority's ability to achieve favorable operating results despite significant declines in Commonwealth debt service assistance." All three agencies consistently note that MWRA's conservative financial management and long-term planning contribute to MWRA's strong financial position.

### MANAGING RATES AND CONTROLLING OPERATING COSTS

MWRA is a "wholesaler" to its member communities. Each community sets its own retail rates for water and sewer use by local businesses and residents. MWRA's charges ("community assessments") typically represent about 45% of the amount that communities bill their customers. The local portion of the bill varies considerably among communities. Over the last five years, the average wholesale rate increase has been 4.6% for combined water and sewer charges.

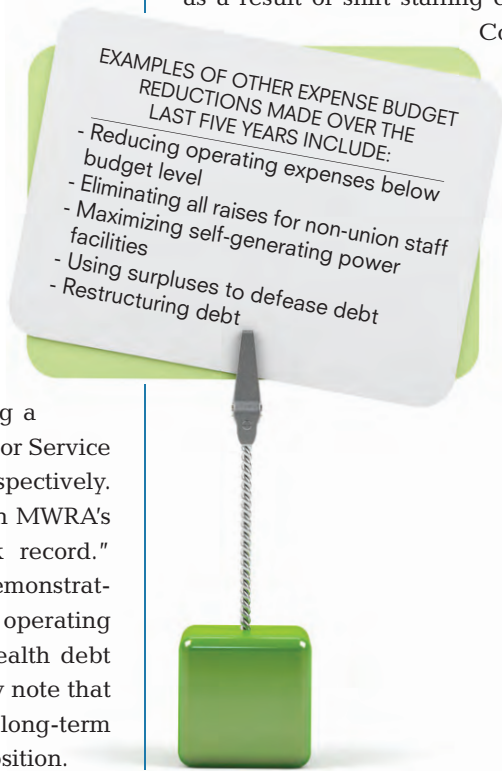
The biggest driver of MWRA's budget is debt service (the share of its budget for principal and interest payments) on the bonds that financed major capital improvement projects. Debt service represents 58% of MWRA's total budget.

During the annual budget cycle, MWRA takes a hard look at its operations and makes a concerted effort to ratchet down its costs.

MWRA has had a long-term commitment to reducing its head count and staffing continues to decline. From the peak in 1997, over 500 positions have been eliminated - representing a 31% reduction in workforce. MWRA has achieved these reductions by installing automation and implementing other staffing efficiency initiatives across the agency. For example, in 2009 MWRA reduced minimum staffing levels at certain wastewater facilities during dry weather conditions since less staff are needed than under wet weather conditions.

Control of overtime spending is also a key focus point for MWRA management. Despite a shrinking workforce, overtime spending since 2003 has been below FY2000 spending levels when adjusted for inflation. In 2009, overtime was cut as a result of shift staffing changes at MWRA's Operations

Control Center and a reduction in minimal staffing at its wastewater headworks facilities.



### MAKING DO WITHOUT DEBT SERVICE ASSISTANCE

Debt Service Assistance from the Commonwealth had been a vital tool, and by the early 2000s, MWRA was eligible for almost \$53 million in annual appropriations. However, with the state's fiscal crisis of 2003, the program was eliminated. Over the next few years, funding was restored at much lower, but increasing levels. But appropriations for 2009 and 2010 included in draft budgets were withdrawn due to the most recent financial crisis. Reinstatement of this program is questionable for the foreseeable future.

### DEVELOPMENT OF A MASTER PLAN

In December 2006, MWRA completed a Master Planning process for its water and sewer systems, identifying approximately \$2.0 billion in wastewater needs and \$1.1 billion in waterworks needs for the FY07-48 timeframe, primarily for the repair or replacement of existing infrastructure and to provide much-needed redundancy in parts of its water transmission and distribution system. Projects to renew old water and sewer pipelines and to ensure delivery of water in an emergency were previously eliminated or deferred from the Capital Improvement Program due to reductions in Debt Service Assistance and because MWRA must first consider the financial impacts of expensive federally mandated projects.

The Master Plan documents the investment needs of MWRA's regional water and wastewater systems over the next 40 years, identifies 292 corresponding projects estimated at \$3.1 billion in 2006 dollars, and prioritizes projects for consideration in the Capital Improvement Program beginning in FY2008.

### MAXIMIZING AMERICAN RECOVERY AND REINVESTMENT ACT (ARRA) FUNDING

MWRA has been aggressively pursuing every opportunity for stimulus funding under the federal American Recovery and Reinvestment Act.



MWRA was represented on three Task Forces - Municipal Facilities, Energy, and Procurement - as part of the Commonwealth's preparation for stimulus dollars. Based on MWRA's capital improvement program and business plan, staff submitted lists of projects for funding in three categories - Water, Wastewater and Clean Energy - that could start construction by February 2010.

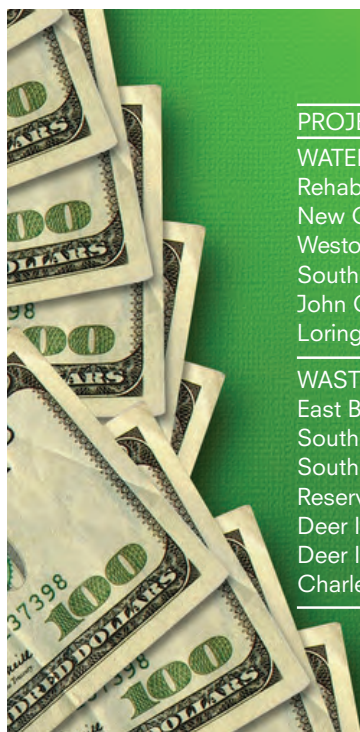
MWRA is slated to receive over \$33 million in ARRA funding, of which \$9.6 million is for water projects and \$23.5 million for wastewater projects.

On August 11, 2009, EPA Administrator Lisa P. Jackson was at the Deer Island Treatment Plant to announce funding for the national stimulus effort on energy efficiency and renewable energy at wastewater and drinking water facilities across the country. Among the projects in Massachusetts is a \$1.1 million design/build project for a 180 kW roof-mounted solar photovoltaic system which was installed on the Maintenance/Warehouse Building at the Deer Island Wastewater Treatment Plant.

This project is being funded in part through ARRA for the Clean Water State Revolving Fund (SRF) stimulus funding currently allocated to MWRA by the Massachusetts Department of Environmental Protection.

Stimulus Funding for MWRA Projects

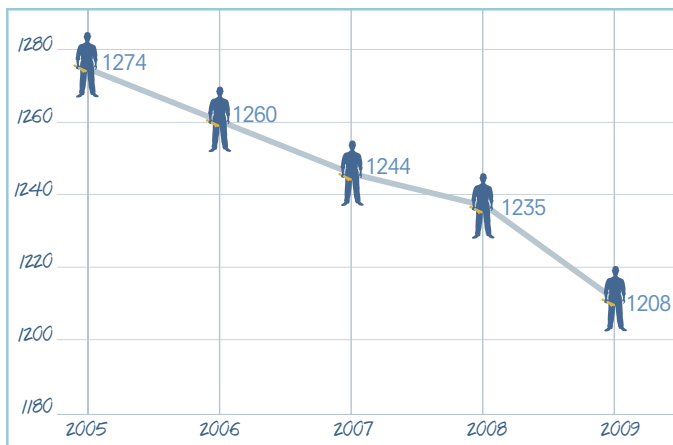
PROJECT	CONTRACT VALUE	ARRA ALLOCATION
<b>WATER</b>		
Rehabilitation of Lower Hultman	\$47,542,388	\$3,602,688
New Connecting Mains - Section 18, 50 & 51	\$4,720,826	\$605,494
Weston Aqueduct Supply Mains Section 28 to Brattle Court	\$1,978,895	\$322,930
Southern Spine, Section 107 - Phase 2	\$19,980,060	\$1,307,219
John Carroll Water Treatment Plant Solar	\$2,187,414	\$2,187,414
Loring Road Hydroelectric	\$1,918,890	\$1,525,000
<b>WASTEWATER</b>		
East Boston Branch Sewer, Section 38 & 207	\$7,344,286	\$2,409,754
South Boston CSO - Ventilation Building	\$5,162,500	\$2,581,250
South Boston CSO - Pump Station & Sewers	\$25,871,994	\$6,518,050
Reserved Channel Sewer Separation, Contact 2	\$5,874,700	\$2,254,286
Deer Island Clarifier Rehabilitation	\$59,377,664	\$4,236,660
Deer Island Solar	\$1,119,000	\$735,000
Charlestown Wind Turbine	\$4,686,500	\$4,686,500



## The MWRA Workplace

### FEWER STAFF, SAME SERVICE

Over the last five years, MWRA continued to reduce the staffing levels across the agency. By June 2010, the headcount was 1,208, a reduction of almost one-third over the last several years. Most of the vacancies have been created by retirements and MWRA management very carefully reviews the need for each vacant position. For instance, instead of backfilling a senior management position in 2009, two existing divisions – Support Services and Finance – were merged into a more traditional Administration and Finance Division, eliminating duplications and creating efficiencies.



MWRA is currently embarking on a staffing study, as recommended by the three Advisory Board-appointed members of the Board of Directors to provide an independent review

of how MWRA staffing levels compare to similar water and wastewater utilities and provide MWRA with an approach for evaluating staffing levels.

### CONTINUED COMMITMENT TO EQUAL OPPORTUNITY

MWRA's Affirmative Action Plan sets out the basic parameters of MWRA's commitment to Equal Opportunity in the areas of Employment and Minority/Women Business Enterprise participation in MWRA procurements and contracted services. MWRA updates its Affirmative Action Plan annually and provides information on the development, implementation and monitoring of the various plan elements in accordance with guidelines of the U.S. Department of Labor, Office of Federal Contract Compliance Programs.

Through 2009, the overall MWRA affirmative action workforce staffing goal for females was 25.3% in the aggregate and workforce staffing at the end of the 2009 Plan Year was 23.3%. The current overall MWRA affirmative action workforce staffing goal for minorities was 17.3% in the aggregate and workforce staffing at the end of 2009 Plan Year was 18.6%.

### IMPROVING WORKPLACE SKILLS

MWRA provides both in-house and contracted training programs to its employees to ensure compliance with license requirements, increase safety, and provide opportunities for technical and professional development. Over the last five years, a number of important training programs were held:

- In 2007, all MWRA employees received mandatory "Recognizing and Preventing Workplace Harassment" training.
- In 2008, approximately 185 supervisors and managers received mandatory ethics training provided by the Deputy

Chief of the State Ethics Commission's Legal Division. Topics included restrictions on receiving gifts, outside employment, contracting with the public employer, acting on matters in which family members and business associates have a financial interest, leaving municipal, county or state government to work for companies which conduct business with the town, county or Commonwealth and avoiding appearances of conflicts of interest.

- In 2009, MWRA established the first Flagger Training Program approved in Massachusetts by Mass Highway for certification of trained flaggers. MWRA currently has 191 employees certified as flaggers.

- Also in 2009, 229 MWRA employees were trained in Confined Space Entry, with an additional 123 municipal employees participating from member communities.



# Advisory Committees



## MWRA ADVISORY BOARD

The MWRA Advisory Board was created by the Legislature to represent the interests of MWRA service area communities in the 1984 Enabling Act that established the MWRA. Its members include:

- The chief elected official and a designee from each of the 60 member cities and towns;
- A member of the Metropolitan Area Planning Council;
- Six gubernatorial appointees representing various interests.

The Advisory Board reviews and comments on MWRA capital and current expense budgets, as well as MWRA practices and policies. The Advisory Board is dedicated to seeking rate relief for its member communities and has been the driving force behind the state's Debt Service Assistance program. When the recent fiscal crisis forced elimination of that program, the Advisory Board looked for creative solutions, such as an expanded bottle bill to provide funding of a rate relief program.

## WATER SUPPLY CITIZENS ADVISORY COMMITTEE (WSCAC)

Originally formed in 1977 to review a proposed diversion of the Connecticut River for water supply to the metropolitan Boston area, WSCAC has also developed its own public information materials and a network of volunteer expert consultants. The committee meets monthly in locations around the state.

WSCAC conducts independent research and members organize into task forces devoted to more intensive study of particular issues.

WSCAC's diverse membership is balanced geographically and by interest, representing source watershed communities, watershed associations, water utilities, environmental groups, business, water users, and other interested parties. WSCAC provides an ongoing source of public input for the MWRA and state agencies.



## WASTEWATER ADVISORY COMMITTEE (WAC)

The MWRA Board of Directors created WAC in 1990 to offer independent recommendations on wastewater policies and programs. WAC's mission is to be a citizens advisory committee to the MWRA, providing an independent public forum for holistic discussion of wastewater issues. Membership is designed to reflect the knowledge and interests of major affected constituencies: engineering and construction, environmental advocacy, planning, academic research, and business.

The committee meets monthly. The agenda is geared to provide timely recommendations to the Board of Directors and MWRA staff on policy, project plans, program initiatives, and public concerns. Current areas of focus are CSOs, System Expansion, and Maintenance. WAC is an independent voice in these areas. A diverse group of participants, including MWRA staff, representatives of environmental agencies and organizations, as well as municipal officials, attends meetings. Interested citizens also participate. The meetings involve lively discussions as a result of diverse opinions, leading to recommendations that capture the spirit of diversity.



## Partnership with Member Communities

### FINANCIAL ASSISTANCE PROGRAMS

MWRA helps member communities improve their own systems. Since FY01, \$163 million has been distributed to fund 194 local water pipeline improvement projects in 30 MWRA member water communities through MWRA's Local Pipeline Assistance Program. On the wastewater side, all 43 member sewer communities have participated in MWRA's Infiltration/Inflow Local Financial Assistance Program; since FY93, MWRA has distributed more than \$181 million to fund 367 local I/I reduction and sewer system rehabilitation projects.

Over the last five years, participation in these programs continued at a steady rate and MWRA disbursed a total of \$80.9 million for I/I projects and \$94.9 million for Local Pipeline Projects.



MWRA crew inspects a community-owned sewer line

### HELPING COMMUNITIES WITH EMERGENCY RESPONSE PLANNING

In an effort to increase protection against water treatment chemical incidents, water security incidents and major natural disasters, DEP announced significant changes in its emergency response and chemical safety requirements. The deadline for all water suppliers to finalize and submit their Emergency Response Plans was December 31, 2009. MWRA and its member communities faced a significant challenge in complying with these requirements.

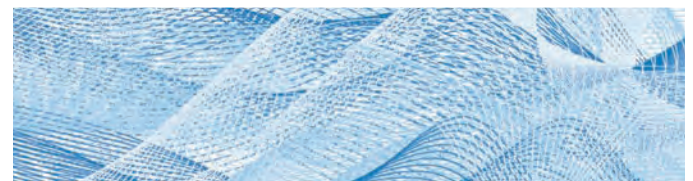
Since MWRA had spent a great deal of time and effort on its own Plan and had developed internal standard operating procedures, staff developed a comprehensive training program to provide assistance to its member communities and held a series of workshops on DEP-compliant "fill-in-the-blanks" templates. This ensured the communities' timely and cost-effective compliance with these requirements.

MWRA is also developing a training program for its own staff and community staff to enable compliance with annual DEP training requirements and will make training opportunities available on a year-round schedule.

### ACCOUNTABILITY AND TRANSPARENCY

As a public agency, MWRA believes its ratepayers should have easy access to information on water quality, rates and charges, and construction programs. Over the last five years, MWRA's website – [www.mwra.com](http://www.mwra.com) – has continued to evolve into a user-friendly repository for our customers. Information posted on the web includes:

- Drinking Water Quality Reports
- Boston Harbor and Massachusetts Bay Water Quality Data
- Quarterly Performance Reports
- Water Conservation Information
- Press Releases
- Agendas for Board of Directors' meetings
- Court Reports
- Rates and Budget Information
- Official Financial Statements
- Construction Project Updates

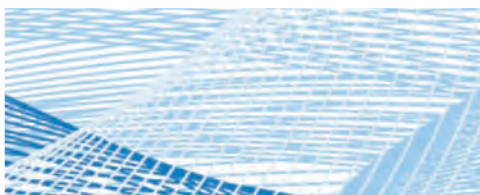


# Looking Ahead

The Citizen Panel's letter at the beginning of this report points out a number of challenges facing the agency, including the need to continue to renew and replace the aging infrastructure, looking for new sources of revenue and planning for climate change.



Over the next five year period, MWRA will face these challenges and more. This year, the March storms and May water main break have only reinforced the importance of the critical services MWRA provides to the 2.3 million people in its service area. MWRA will strive to meet each challenge, but it will be difficult without some form of financial support from the state or federal government. Also, regulators must take the financial burdens of each action into account when setting new mandates.



The downstream face of Winsor Dam at Quabbin

## CONTINUED INVESTMENT IN INFRASTRUCTURE

Since 1985, MWRA has invested over \$7.1 billion to modernize and improve the wastewater and waterworks systems, including \$3.8 billion for the completed Boston Harbor Project and \$1.7 billion for its nearly complete water quality improvement program. In addition, MWRA is now spending a large part of its Capital Improvement Program (CIP) budget on the \$878 million Combined Sewer Overflow (CSO) program.

Another \$293 million in spending is planned during this timeframe to construct or rehabilitate wastewater interceptors (average age is 75 years) and facilities, including pump stations and remote headworks that have not been upgraded.

In the drinking water system, MWRA expects to spend \$500 million in the FY09-18 timeframe on rehabilitation or replacement of existing pipelines and transmission and distribution system redundancy pipelines.

MWRA is also planning projects to add redundancy where none currently exists for the Southern Extra High and Northern Intermediate High pressure zones.

## An Uncertain Regulatory Environment for MWRA and Its Customer Communities

### NEW DISCHARGE PERMIT

Plans for MWRA's capital and operating programs and expenditures are influenced by the direction of state and federal regulation and policy. Dollars that could have been directed to rehabilitating or improving existing infrastructure are at risk of being redirected based on regulatory priorities. MWRA's approach to this uncertainty is to stress to regulators and policy makers the need to have their decisions supported by sound science.

A key issue where consensus with regulators remains to be reached is MWRA's National Pollutant Discharge Elimination System (NPDES) Permit



for Deer Island. The permit expired in 2005, and negotiations toward a new permit have only recently started with EPA. Among a number of issues, the new permit will have implications for member MWRA communities, who may see stepped-up enforcement efforts and could become direct parties to the permit.

The new permit will also determine the scope and cost of monitoring Massachusetts Bay near the Deer Island outfall. After nearly ten years of peer-reviewed scientific reports and data analysis continue to show no adverse impacts from the outfall, MWRA argued to EPA for saving an estimated \$1.3 million in annual monitoring costs by reducing the scope of monitoring while the new permit is pending. These scope reductions were supported by the Outfall Monitoring Science Advisory Panel. While EPA rejected MWRA's request for interim modifications, they indicated that they will consider the proposed changes as part of the permit's full review process.

A major regulatory development that will impact MWRA member communities are proposed changes to EPA's "MS4" stormwater permitting program, which addresses stormwater discharges from small Municipal Separate Storm Sewer Systems in urbanized areas. New draft MS4 permits include provisions to protect water quality standards, water quality monitoring of storm water discharges, encouragement of low impact development and green infrastructure, and requirements designed to implement approved total maximum daily load (TMDL) waste load allocations (WLAs). These requirements will be costly for communities to meet and come at a time when local budgets are already severely challenged. EPA plans to issue final permits later in 2010.

### NEW DRINKING WATER REGULATIONS

Over the next several years, EPA is expected to revise to important drinking water rules: the Total Coliform Rule (TCR) which regulates distribution system water quality, and the Lead and Copper Rule which affects treatment decisions by MWRA, local community efforts to replace old lead service lines, education efforts by MWRA, health officials and locals water departments, and homeowners' own plumbing.

MWRA is well-positioned for the changes in the TCR as rehabilitating MWRA and community distribution systems has been a key component of its Integrated Water Supply Improvement program over the last 15 years. Likewise, MWRA has been a leader in lead education and corrosion

control, and system-wide lead levels at the tap have dropped over 80% and consistently been below EPA standards for the last 6 years. However, some communities still have lead services, and will need to continue efforts to replace them, and MWRA continues to work nationally to reduce lead levels new brass fixtures. Both the distribution system improvements and the lead service line replacement efforts will continue for many years.

### WEIGHING ALTERNATIVES FOR MANAGING WASTEWATER RESIDUALS

MWRA is facing a potential reinvestment of \$87 million over the 2010-2018 timeframe at its Residuals Processing Facility at Fore River due to equipment aging and obsolescence. Reinvestment needs are being evaluated within a multi-pronged context: the expiration of the current contract with New England Fertilizer Company in 2015, potential changes to the regulatory climate for biosolids disposal, the continuing emergence of new technologies that reduce sludge quantities or extract energy from sludge, and whether alternative approaches to MWRA's current commitment to beneficial reuse are economically and environmentally sound. Recommendations will be presented to MWRA's Board of Directors after completion of a study evaluating alternative technologies within this broad context.

### MAINTAINING PUBLIC CONFIDENCE IN THE DRINKING WATER SYSTEM

In the recent past, MWRA has responded to national or regional news stories about arsenic, atrazine, disinfection by-products and perchlorate and pharmaceuticals found in other water systems. Each story like this has the potential to cause consumers to doubt the safety of their water supply. MWRA has been utilizing many tools to assure consumers that these contaminants are not found in their water system: clear notices are posted immediately on MWRA's website (with titles

like "Atrazine Not Found In MWRA's Water Supply").

All water quality data are also posted on the website, monthly data is sent to community water superintendents, and the annual EPA-required Consumer Confidence Report is mailed to every household in the service area. In addition, MWRA's School

Education Program makes presentations in local classrooms about the high quality of drinking water. Even with the wide distribution of information, each negative story may cause consumer doubt. Maintaining public confidence in MWRA's drinking water remains a paramount objective.



## EXPANSION OF THE WATER SERVICE AREA

MWRA is nationally recognized for its success in conserving water. As discussed in Chapter 2, water demand in the service area has decreased by over 120 million gallons per day since the late 1980s and continues to decline. To help relieve continuing pressure on rates, MWRA has proposed for some time now to target a part of the difference between its 300 million-gallon-per-day water system "safe yield" and its current demand of around 200 mgd to a program of water system expansion to new customer communities.

Adding new communities to MWRA's water system would not only provide rate relief, but could provide critical environmental relief as well. MWRA's service area is surrounded by watersheds (or portions of watersheds) that are stressed, while MWRA is a regional water source with an abundant supply that can be used to help meet the water supply needs of communities in stressed basins.

To frame these and other parameters for a revised system expansion process, MWRA's Board of Directors capped a multi-year exploration of the issues with a facilitated discussion in spring 2010 with opinion leaders who can influence regional water resources policy in the Commonwealth. In addition to MWRA Board members and the Executive Director, discussion participants include the leadership of the MWRA Advisory Board, the Mass Municipal Association, the Metropolitan Area Planning Council, the Smart Growth Alliance, the Pioneer Institute and representatives of watershed advocacy organizations and MWRA's Water Supply Citizens Advisory Committee. MWRA is hopeful that this discussion will yield a streamlined approval system.

The MWRA Advisory Board is a staunch supporter of water system expansion. It has seen MWRA member communities come to grips with the only down side of water conservation: the need for local water departments to spread the rising costs of the MWRA and their own water systems to a largely fixed base of retail customers who are now using less water but are paying higher costs. The Advisory Board's perspective adds an important dimension to the system expansion policy discussion.

MWRA has been described as "one of the state's most durable and effective models for regional cooperation" (Boston Globe editorial, September 1, 2009). This regional system "works" only to the extent that there is a strong relationship



Removing Eurasian Water Milfoil at Wachusett Reservoir

between MWRA and its member communities, and no individual community takes an action that could threaten other members. MWRA has made sweeping investments across the entire system; the costs are borne by all communities regardless of who benefits from a specific improvement.

## CONTROLLING INVASIVE SPECIES

MWRA has been actively addressing aquatic invasive plants at both source and backup distribution reservoirs since 2002. Plants such as Eurasian Waterfoil, Fanwort and Water Chestnut are known to be present in the Wachusett, Sudbury and Chestnut Hill Reservoirs.

Because MWRA cannot use herbicides in drinking water supplies, management of these invasive plants involves a range of methods. At Wachusett, gentle hand-pulling of plants by divers ensures that the plants are removed with the roots intact. At Chestnut Hill, MWRA has been lowering the Reservoir during the winter months to allow plants to freeze and die.

In June 2009, zebra mussels, a highly aggressive aquatic invasive species, were found in Laurel Lake in the Berkshires, approximately 50 miles from the Quabbin Reservoir. In response, the MWRA Board voted to temporarily ban all private boats from the Quabbin Reservoir, to avoid any possibility that zebra mussels would be transferred into the reservoir.

After 45 days of inspections, no evidence of zebra mussels was found in the reservoir. A thorough boat washing and sealing program was developed to prevent the transfer of mussels or aquatic invasive plants into the Quabbin Reservoir.



Going forward, the Quabbin boat washing program will continue. MWRA must guard against the introduction of species like zebra mussels. Once entrenched, they are virtually impossible to eliminate and can cause crippling damage to infrastructure and have a negative impact on water quality. The control and removal of invasive aquatic plants and animals is labor intensive and expensive, but MWRA must remain vigilant against these intruders.

Rates & Budget Projections					
	FY11	FY12	FY13	FY14	FY15
Total Rate Revenue Requirement	\$569,800.00	\$592,299.00	\$615,689.00	\$663,651.00	\$715,311.00
Increase Over Previous Year	1.49%	3.90%	3.90%	7.80%	7.80%
Estimated Household Bill (61,000 gallons)	\$834.00	\$871.00	\$913.00	\$965.00	\$1,027.00

### PLANNING WITH CLIMATE CHANGE IN MIND

While the science and specifics are still evolving, responsible water and wastewater systems across the country are incorporating the possibilities of climate change into their long term planning. Leveraging the efforts of EPA, MAPC, the Water Research Foundation and other organizations, MWRA has participated in a number of regional and national planning efforts to examine how climate change may affect our water sources, and how sea level rise will affect our coastal facilities. Looking at how changes in the frequency and intensity of storms may affect system operations will be a priority as climate modeling produces detailed scenarios. Preliminary indications are reasonably positive: the far-sighted developers of MWRA's reservoir systems and the significant reductions in demand mean that supplies will remain adequate for its own communities and could be a resource for less fortunate neighbors. Planning for Deer Island used early estimates of sea level rise, and most coastal facilities appear to be properly protected.

### MAINTAINING A QUALIFIED WORKFORCE

MWRA will be undertaking a staffing study to determine the most efficient mix of operations, engineering and finance support personnel. According to the American Water Works Association, the average water utility will lose 50% of its workforce in the 2010-2020 timeframe. Currently, the average age of MWRA's workforce is 51 and average length of service is 16 years. Succession planning must begin now to ensure continuity of operations at the present skill level.

### KEEPING RATES AFFORDABLE

In recognition of the extraordinary economic difficulties that its member communities face, MWRA set a 1.49% rate increase for FY2011. This is the smallest rate increase since 1996, when MWRA rates were offset by \$31.5 million in Debt Service Assistance from the Commonwealth.

The low FY 2011 rate increase is part of a multi-year financial strategy developed by MWRA and its Advisory Board. The plan also calls for predictable, modest rate increases of 3.9% in fiscal years 2012 and 2013. MWRA expects 2014 rates to be mitigated by a sizeable release of financial reserves.

Employing this multi-year strategy will provide much needed rate relief in the short-term, and will maintain the Authority's strong credit rating which is critical to accessing the capital markets and ensuring lower borrowing costs.





### **MWRA Advisory Board**

Katherine Haynes Dunphy, Current Advisory Board Chair  
Joseph E. Favaloro, Advisory Board Executive Director

### **Former Advisory Board Chairs 1985-2001**

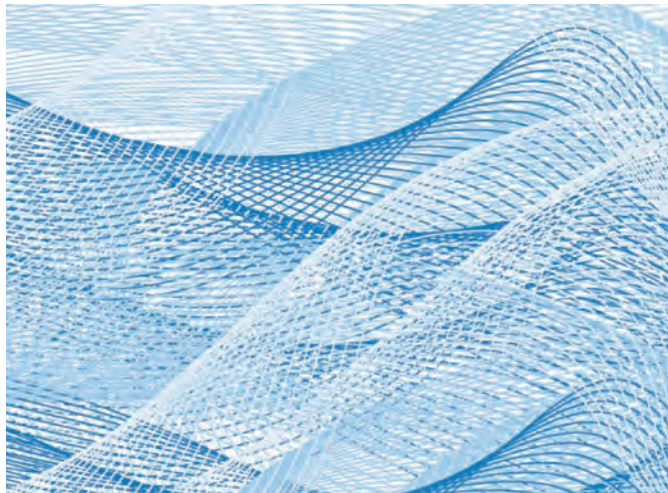
Walter Woods  
Andrew M. Pappastergion  
Norman P. Jacques  
Robert Healey  
Joseph C. Foti

### **Former MWRA Executive Directors 1985-2001**

Michael Gritzuk  
Paul F. Levy  
Douglas B. MacDonald

### **Former MWRA Board Members**

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Stephen R. Pritchard • July 2005 - August 2006  
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Jonathan Z. Souweine • February 1985 - January 1989  
Robert Spinney • June 1997 - April 2002  
Susan F. Tierney, Chairman • January 1991 - March 1993



*Dedication:*

This report is dedicated to the memory of  
**WILLIAM A. BRUTSCH,**  
who served as the steward of the water system during his  
32-year career with the Metropolitan District  
Commission and the MWRA. Under his leadership,  
the foundations were laid for the modernization of one of the  
country's great water systems. He also  
spearheaded a water conservation program in the early  
1990s, which eliminated the need for new source develop-  
ment and has resulted in a decrease of over 120 million  
gallons per day. Bill is buried at the Quabbin Park Cemetery,  
by the shores of the great waters he cared for so much.



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Written by: Ria Convery  
Designed by: Rita Berkeley



MASSACHUSETTS WATER RESOURCES AUTHORITY



Charlestown Navy Yard  
Building 39  
Boston, MA 02129  
617.242.6000  
[www.mwra.com](http://www.mwra.com)

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