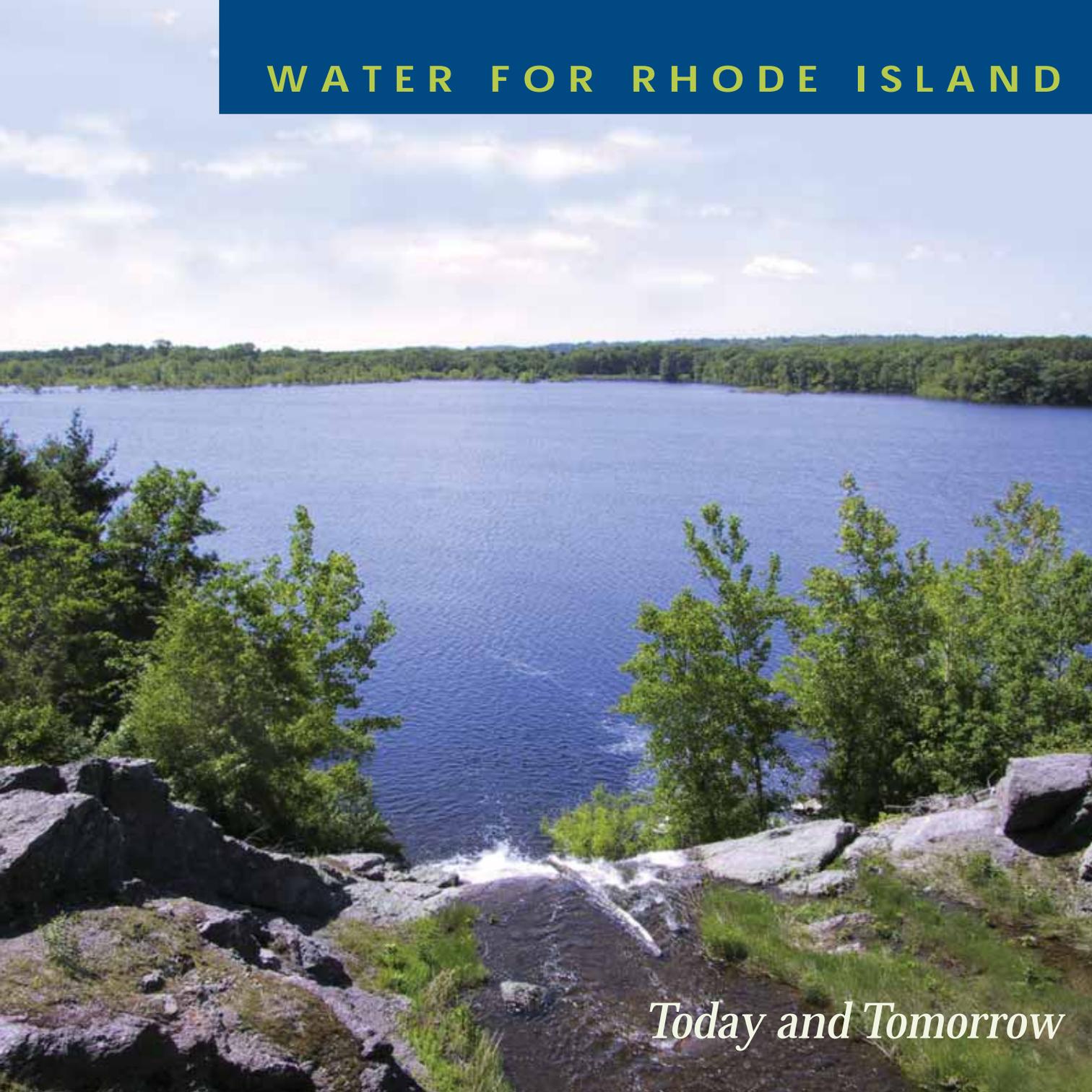


WATER FOR RHODE ISLAND



Today and Tomorrow

WHY WORRY?

Only 3% of the world's water is fresh. Less than 1% is usable.

We are using the same water the dinosaurs drank and swam in. For eons the amount of water on earth has not changed. The same water has evaporated, rained, snowed, frozen, melted, run off, been dammed, quenched, irrigated, put out fires, supported aquatic life, produced goods, carried waste, infiltrated, evaporated, rained, snowed, frozen...

When water is contaminated,

When water cannot soak into the ground to be stored,

When too much water is withdrawn from storage,

We cannot meet our every-day needs

for human life

for fire fighting

for sanitation

for food

for nature,

and for our economy...



There is no new water.

WHERE DOES OUR WATER COME FROM?

Reservoirs supply 85% of public water in Rhode Island. Groundwater wells supply the rest.

Between 39 and 54 inches of precipitation fall across the state, spread fairly evenly over the 12 months of the year, providing all the water we use.

When it rains or snows, the condition of the ground determines what happens next. Rain falling in forests is scattered into smaller drops and soaks into the ground. The roots of plants take up some of the rain, and some evaporates into the air.

Some seeps into the earth to become groundwater. Groundwater is stored in tiny spaces between grains of sand and gravel, where it feeds our streams, rivers, and ponds or where it can be tapped by wells.

However, rain falling on pavement may flow swiftly, picking up pollutants and then dumping them into streams, ponds, and the bay rather than replenishing drinking water supplies.

In August 2005, low rainfall and high water demand from groundwater caused record low flows in the Hunt River. These reductions may adversely affect aquatic habitats. More efficient use of water and better coordination between suppliers can balance water needs.¹





HOW IS WATER CONNECTED?

***The land draining to a river, pond or bay is its watershed.
The watershed stores and transmits water.***

All water that is used whether it is in the ground, in a stream or in a faucet is connected by the water cycle that continually moves moisture from the ground, trees, ponds and ocean skyward to form rain or snow. Water that we use for our homes, businesses and farms is part of the same water that is used for swimming, fishing and nourishing nature.

Groundwater emerges in low places as seeps, springs, ponds, bogs, wetlands, rivers and streams. Even when it has not rained for a while, rivers and streams continue to flow because they are replenished by groundwater.

When a well is set into the earth, it siphons water from the fraction of rain that has infiltrated to the water table. If we take more water from the watershed than is replaced by rain, river-flow will drop or stop altogether and wetlands will dry up.

Our granite bedrock does not contain underground rivers. It does contain fissures and cracks that may hold and transmit small amounts of water.

What we do in one part of the water cycle affects the others. When we take water for one use, it is not available for another. Pollution from run-off also makes water unusable. Toxins and pathogens are removed when water evaporates, but pollution can be introduced again when rain forms in and falls through dirty air.

WATER BUDGET
Rain + Groundwater – Society's Uses =
Nature's Water

WHO USES FRESH WATER?

Rhode Islanders use approximately 429 million gallons of water per day,² or enough to flood 143 football fields to the crossbars of the goal posts. Household use averages 58-72 gallons per person each day in winter. In summer, watering lawns and gardens increases use an additional 30-50 gallons daily per person.





WHO MANAGES WATER?

Many agencies work to assure quality and manage quantity.

- **RI Water Resources Board**
Manages the state's freshwater resources with special emphasis on supply for people, economy and environment.
- **RI Department of Environmental Management**
Manages and regulates the state's water resources under state and federal laws.
- **Public Utilities Commission**
Regulates rates charged by water suppliers who sell to areas outside their service district and by privately owned water companies.
- **RI Department of Health**
Regulates drinking water under the federal Safe Drinking Water Act and monitors public beaches for bacterial contamination.
- **Statewide Planning Program**
Creates plans, approved after public hearing, to guide future development of the state.
- **Water Suppliers**
In RI 480 supply systems range from the well in a rural restaurant to the 28 large systems that provide public water.
- **Federal Agencies**
U. S. Geological Survey is contracted by state agencies to assess and map water and geological resources. Other federal agencies provide standards, education & research.
- **Municipalities**
Local boards develop comprehensive plans and issue zoning and subdivision ordinances that determine what happens to water resources.



Us! We manage water when we install low-flow toilets and shower-heads, when we avoid lawn watering, and when we support integrated water resource management.



WHY ARE SO MANY INVOLVED?

Getting water to our homes, a roadside restaurant, or a manufacturer requires a source, protecting the source, creating a system of pipes and pumps, testing water, treating water, balancing supplies against many demands, setting fees, educating users, maintaining systems, and coordinating all these activities.

Water management in Rhode Island grew by opportunity and not by plan. It still reflects our village culture and history where private, community based water supply companies grew out of the fire districts formed in early mill towns. As populations grew, some towns formed their own public water supplies.

In 1915 the City of Providence began to condemn land and dam the Pawtuxet River to form the Scituate Reservoir. As the metro area spread, Johnston, Cranston and North Providence connected to the Providence system. When East Providence and Lincoln water supplies were contaminated in the 1980s, these systems began to buy water from Providence. Now, 60 percent of the state's residents obtain water from Scituate Reservoir System.

Many small public supplies for rural nursing homes, restaurants, schools, churches, trailer parks, and town halls require oversight to assure healthy water.

Rhode Island's future depends on state and local agencies working efficiently as a team to address environmental issues and economic opportunities.





WHAT DOES WATER COST?

Water is a priceless natural resource, a part of nature that seems free. But there are costs for pumping, treating and delivering water, as well as environmental and social costs of water use.



The 28 largest public water suppliers in Rhode Island provide drinking water at an average annual cost of about \$335 per year for a single-family home. That's less than \$1 per day, not a lot of money for one of the most basic needs of life, our health, our community and our economy.

When we pay a water bill, we are really paying for only part of the true cost of water. We pay to get

water to our homes, and we pay to dispose of 'used' water. If your community has sewers, you pay to build the sewage treatment plant through taxes and to treat the wastewater through your sewage bill. If you have a septic system you pay for building, inspecting and maintaining the system. The more water you use, the more you pay.



What is the cost if farmers can no longer water crops?

If brook trout disappear? If we can no longer swim or canoe? How does our use of water today impact our quality of life now and into the future?

IS THERE ENOUGH WATER?



It depends on —

- Where we live
 - Geology and precipitation vary across our state
 - Water supply arrangements differ from place to place
- Choices we and our public officials make about
 - Managing the abundant yet finite water in Rhode Island
 - How much water to leave for nature
- How much we are willing to pay
 - For water and its disposal
 - To protect river flow and a healthy Narragansett Bay



How much are we willing to conserve?



■ Efficient Use of Water

Water, when plentiful, presents great opportunities. When unavailable or in short supply, water presents major challenges for today's society that expects water to be readily available, inexpensive and abundant.



In Rhode Island, water is not always readily available when and where it is needed. For growth opportunities to continue into the future, more efficient and better use of water is needed to improve its availability.

Residential users, in particular, need to curb wasteful summertime use of water, such as over-use of drinking water on large lawn areas.

Other opportunities also exist for reuse and recycling of water and wastewater. New construction and rehab of existing space for commercial and manufacturing businesses should include the use of “green building” techniques to incorporate reuse and recycling of water.

While development of new sources of water will occur, the quickest means of finding new water is through improved efficiencies of usage.

Juan Mariscal, P.E.
General Manager
RI Water Resources Board





■ Managing Water for Growth

I believe that if we are willing to be proactive and strategic in the management of our water resources, water will become a competitive advantage for Rhode Island. Being strategic rather than simply regulatory means setting stream flow



standards and managing demand to achieve them. It means finding ways to balance water needs so we can grow clean, high wage industries and the productivity of local agriculture while making progress toward fishable and swimmable rivers and bays. We are already stressing our

environment in some parts of the state with current water use levels and more development is planned. The sooner we take water availability seriously, the stronger our economy will be in the long-term.



Beth Ashman Collins

Director of Research

Rhode Island Economic Policy Council





■ Sustainable Water

The good news for us is that our community now has fairly strong land use regulations that help to protect the little that's left of the town's rural character. The less good news is that many developments were grandfathered in under older ordinances. Behind our home, a beautiful 40-acre forested wetland and watershed is scheduled for a 30-house development where today's rules would allow only two houses to be built.

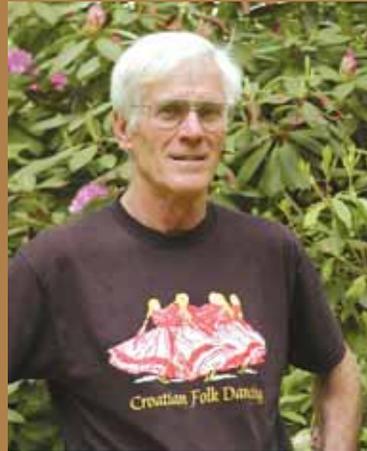
When the steep terrain is clear-cut, paved and landscaped, little soaking in of groundwater will occur. Our own well may eventually run dry.



Robert Sumner-Mack, M.D.

Resident

Cumberland





■ Harvesting Water for Farms

Farms in Rhode Island are essential to the economic and scenic well being of the state. It is important that they have access to water to remain viable. It is also important that they manage their water needs responsibly.

Federal funds through the USDA's Natural Resources Conservation Service have helped us in recent years. Three years ago, we were able to enlarge our pond with federal drought relief money. While this has helped tremendously, we are still forced to find other more costly water sources when severe droughts hit as it did in 2005. That drives up our production costs significantly.



Federal and state support is crucial to helping farmers remain successful while protecting the watersheds of the state.



Michael Hutchison

Casey Farm

North Kingstown



■ Water for Wildlife Communities

The number of days that a pond holds water (hydroperiod) is one of the most critical factors determining wildlife use of ponds throughout southern New



England. Here many species of amphibians, reptiles, mammals, and birds use ponds that dry annually, and some species (e.g., pool-breeding amphibians) are dependent on these seasonal wetlands. If the pond's hydroperiod is too brief, then juveniles don't have



enough time for successful development. Most species of pond-breeding amphibians in the region require ponds to have surface water until early August. Thus, disturbances that alter pond hydroperiod could have a dramatic impact on wildlife community structure in the region.

In addition, quite a few species of terrestrial wildlife depend on streams for some part of their annual cycle. At least three species of amphibians breed in streams. Therefore, alterations that impact stream hydroperiod could also have a devastating impact on many species of wildlife in Rhode Island.

Dr. Peter Paton

Associate Professor & Chair

Dept. of Natural Resources Science

University of Rhode Island



■ Planning for the Future

Water is a crucial, perhaps the crucial ingredient to the long-term preservation of Rhode Island's special quality of life. How we manage and use our existing water supplies will determine the success of our efforts in economic development, land use and public health. This will require a far greater level of cooperation and collaboration at the state and local level than most Rhode Islanders are accustomed to. The work of the Water Allocation Program Advisory Committee (WAPAC) initiated a strategic planning process for integrated water management which can help to preserve economic prosperity.



Robert Griffith, Ph.D.

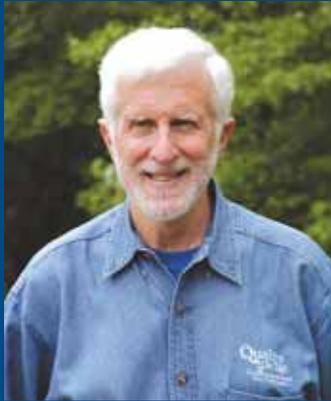
Chief of Strategic Planning

RI Department of Administration



■ Developing Needed New Water Supplies

We tend to take water for granted even though it is absolutely essential. In Rhode Island, we have become accustomed to the luxury of using drinking water for sanitation, fire fighting, and a host of other activities. Water can not be owned because, like air, it is in motion. Water is used by everybody and is shared by all. Water is so essential to life that it should be free, however, most of us do not own a pristine source of water or even live close to the water that we need. In fact, we only recognize the true value or cost of water when it is not available.



In wet years and dry years, Rhode Island must be able to store, treat, and supply water for all users especially during emergencies. System failures and natural calamities

could leave much of our city-state without water. As the late Representative Leona Kelley once said, “If you haven’t got water, you haven’t got much.”

During the wetter times we need to store enough water to meet the dry times and avoid stressing existing systems. We need backup supplies to our primary sources in all regions of the state. The development of a new major water supply is critical to RI’s future. To paraphrase the dairy farmers, “Got Water?”



Henry Meyer
Manager
Kingston Water District

■ Cooling With Less

Stanley Fastening Systems, a manufacturer of fastening tools and fasteners, recognized that the balance between water supply and water demand was becoming a vital issue. Acting on this concern in 2002, a team at Stanley decided to track water usage at the facility. They found that equipment used to cool machinery was the largest contributor to water usage. As a result, the facility started to investigate a more efficient system to conserve water.

In 2004, the company installed a closed loop cooling system, which recycles water and helps to eliminate discharge of non-potable well water. Since its installation, the closed loop system has reduced total water use at the facility by over 1 million gallons per year and has completely eliminated water discharge. The company furthered its water conservation efforts by installing air cooled compressors, air cooled air conditioning condenser units, air cooled fans in key areas within manufacturing and developed a system to recycle the majority of their rinse water.

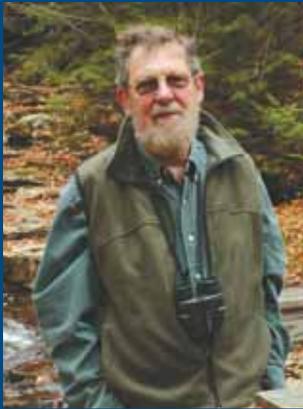
Leading by example, Stanley Fastening Systems' use of water-saving systems shows how water efficiency can benefit both the environment and the company's finances.





■ Understanding Water Management

A sensible approach to managing water supply begins with a distinction between essential uses of potable water (safety, sanitation, human consumption, industrial/commercial) and non-essential uses (any outdoor residential use save irrigation of food crops). The availability of water in a dry year is then estimated and enough set aside to protect the aquatic ecosystem, based on environmental standards that must be developed.



If what remains for human consumption is sufficient to meet essential needs, then competent management will protect the environment in dry years and allow some non-essential uses in wetter years. If essential needs exceed availability, then the costs of providing additional supplies must be compared with the cost of purchasing greater efficiencies in essential uses.

In order to estimate water availability accurately, additional stream gauges must be installed on streams from whose aquifers water will be withdrawn, and funds made available for their dependable operations.

Any major user of water should report water withdrawals on a monthly basis, and permits should be required for new wells, direct withdrawals from streams or significant increases in withdrawals from existing wells. Finally, withdrawals should be coordinated by a state agency to minimize negative impacts of withdrawals on natural systems.

Harold Ward, Ph.D.

Chair, Coalition for Water Security



■ Over-Watering Depletes Supply

In summer, residential water use can increase 50% or more, much of which is used on lawns and gardens. According to the National Irrigation Association, most homeowners over-water their yards.

Here are some easy tips for conserving high quality drinking water this season:

- Plant less lawn. Convert lawn area to drought tolerant garden beds or patio areas. Consider this: one inch of water over a 1,000 sq. ft. area (10 ft. by 100ft.) is about 625 gallons. For this same amount of water, you could do 12 loads of laundry; or take 25 showers; or provide 10,000 glasses of water.
- Install a rain gauge. Smart watering begins with a rain gauge to measure weekly rainfall and only sprinkling enough to make the one-inch of water that lawns typically require per week. Over-watering encourages shallow roots, promotes plant disease, and greatly increases the risk of pollution from applied lawn care products.
- Install low pressure/low volume soaker hoses and drip irrigation in beds and gardens. This reduces water losses and puts the water at the plant root zone.
- Install rain barrels or cisterns to collect rainwater from rooftops to water gardens.
- If you have an automatic sprinkler system, learn to manually turn the system off when irrigation is not needed. Consider upgrading to conservation technology.
- Avoid watering streets and driveways which increases pollution risks to storm drains and wastes water.
- Plant drought tolerant plants and lawn grasses – natural rainfall can supply most of the needed moisture. Trouble spots can be converted to attractive, mulched beds of site-suitable trees, shrubs, plants and groundcovers.



| Alyson McCann, *University of Rhode Island, Cooperative Extension*



■ Water-Smart Business

With proper safeguards, reusing water can be an excellent source for many water needs. It relieves stress on rivers, reservoirs and groundwater. Wastewater, either storm-water or treated sewage effluent, provides ample water and often saves money.



In Rhode Island we have been re-using water for a long time. Since the 1800s, Cumberland's Phantom Farm has collected roof runoff from the farmhouse into a large underground cistern to irrigate the orchard. We also have new, innovative models. Recently, the Jamestown Golf Course

began using treated sewage effluent, giving golfers beautiful greens and fairways in a town that has chronic water shortages. Farmer Richard Schartner's new venture in Wickford turned a wet cellar into an asset by collecting the flow, piping it to cool cut flowers and using the return flow to keep greenhouse plants at moderate temperatures. Water collected from the roof adds to the system. Besides saving water, he is saving energy costs for condensers and heaters.

Green roofs, where grasses and other plants provide the roof and use rain as irrigation rather than letting it run-off to gutters, cover the headquarters of the South Providence Development Corporation and Save the Bay. In nearby Massachusetts, the Braintree Mall collects water from the roof for flushing toilets, and the stadium at Foxborough recycles water for plumbing and irrigation.

Many plating and jewelry companies have closed loop baths, reusing water by electronically capturing the metals from the rinse-water. Florida Power & Light's 535 megawatt plant in Johnston is cooled by treated sewage effluent from Cranston.



■ Action at Home and Work

Check for Savings and Take Action at Home and Work!

- Plant landscapes that require little or no water. If you install a sprinkler system, include a soil moisture sensor. Watering lawns at homes or businesses can nearly double water bills.
- Use drip hoses to water gardens efficiently.
- Cover your pool to reduce evaporation and the need to refill.
- Install 1.6 gallon per flush toilets to save 3 to 5 gallons per flush. Bathrooms use about 30% of the water at homes, offices and schools.
- Low-flow showerheads can provide opportunity for savings. Shower shut-off valves can be supplemented by coin-operated showers for difficult cases.
- Businesses, schools, restaurants, nursing homes and hospitals can realize great savings by upgrading to efficient appliances and fixtures, repairing leaks, and planting landscapes that use minimal water.



Take the time to read the information on your water bill so that you can make choices to reduce the next bill.



■ Winning Solutions

Increase Water Use Efficiencies

- Encourage a conservation ethic through an enhanced public education and information program.
- Address excessive outdoor summer water use.
- Provide technical assistance to achieve more efficient water use by businesses, agriculture, institutions and residents.
- Develop and implement water reuse and recycling programs.
- Evaluate and develop water pricing and billing options to promote water use efficiency.

Provide and Protect Water Resources



- Develop Big River groundwater supply system.
- Develop water budgets.
- Manage water within watersheds.
- Coordinate land development with water supply availability consistent with the Rhode Island Land Use 2025 Plan.
- Foster regional management solutions.

Develop Public Water Information Network

- Expand and fully-fund a stream gage and groundwater observation well network.
- Increase water use reporting for water suppliers and self-supply users.

Winning Solutions for coordinated water management in Rhode Island require knowledge, interest, commitment and funding.



■ For Further Information

RI Water Resources Board – <http://www.wrb.state.ri.us/>

RI Department of Environmental Management – <http://www.dem.ri.gov/>

RI Department of Health – <http://www.health.ri.state.us>

US Geological Survey MA-RI Water Science Center – <http://ma.water.usgs.gov/>

University of Rhode Island, Coop Extension – www.healthylandscapes.org

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We are grateful to the working group that produced this booklet: Paul Beaudette of National Wildlife Federation; Terri Bisson of RI DEM; Janet Keller of RI DEM; Juan Mariscal, RI WRB; Beverly O’Keefe of RI WRB; Robert Sumner-Mack, M.D., Greg Gerritt, and reviewers from ECRI; and Eugenia Marks of Audubon Society of RI.

Information in this booklet is based on *Adopted Recommendations of the Water Allocation Program Advisory Committee*, RI WRB, 2004; *Rhode Island’s Water Resources: An Overview & Priority Issues*,” RI WRB, 2005; *Balancing Ground-water Withdrawals and Streamflow in the Hunt-Annaquatucket-Pettaquamscutt Basin, Rhode Island*, Paul M. Barlow & David C. Dickerman, U. S. Geological Survey, 2001; testimony of Harold Ward, Ph.D., before the Joint Legislative Commission on Kent County Water Authority, 2006.

Design: Jill Bock Design

Photos thanks to RI Dept. Environmental Mgt./*Providence Journal*; RI Water Resources Board; Audubon Society of RI/RI Tourism Council; Providence Water Supply Board; The Nature Conservancy; Wood-Pawcatuck Watershed Association; Front Cover, *Arnold Mills Reservoir*, owned & operated by Pawtucket Water Supply

NOTES —

1. From RI WRB and *Balancing Ground-water Withdrawals and Streamflow in the Hunt-Annaquatucket-Pettaquamscutt Basin, Rhode Island*, Paul M. Barlow & David C. Dickerman, U.S. Geological Survey, 2001.
2. *Estimated Use of Water in the United States in 2000*, U.S. Geological Survey, rev. 2005.

A sustainable use of our water resources in Rhode Island requires a significant shift in the way we think about and manage this resource.

Ann Veeger, Ph.D., Associate Professor, Dept. of Geosciences, University of Rhode Island

Water for Rhode Island – Today & Tomorrow...

What will you do?



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