

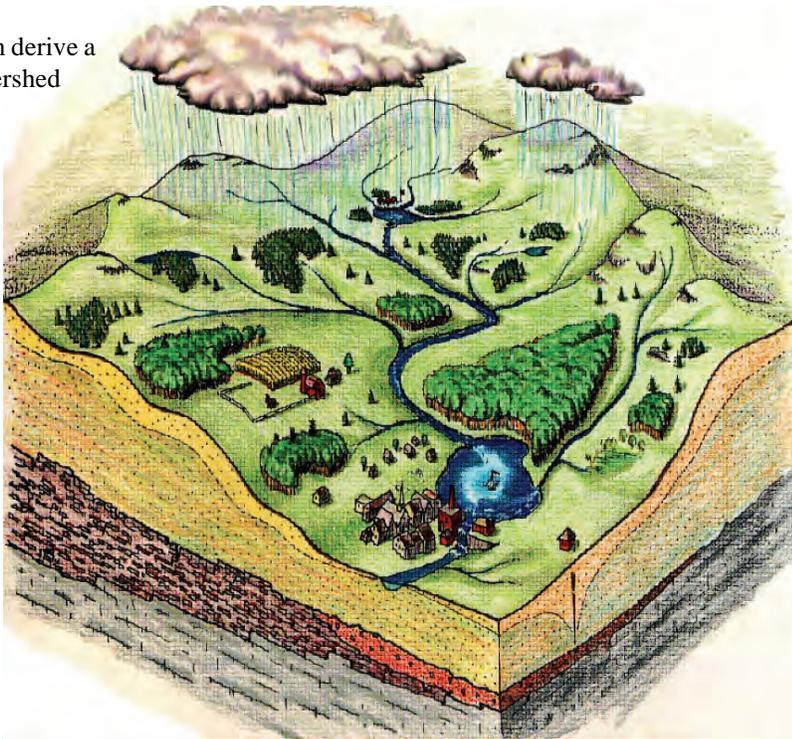
Watershed Management

Beyond the Definition

Water-shed: 1: DIVIDE. 2: A region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water.

Manage: 1: to handle or direct with a degree of skill. 2: to make and keep compliant. 3: to treat with care. 4: to exercise executive, administrative, and supervisory direction.

Looking at Webster's Online Dictionary one can derive a literal definition of "Watershed Management," but what does it mean in the context of DCR's Office of Watershed Management? A more graphic explanation of a watershed can start to help: a geographic area of land in which all surface and ground water flows downhill to a common point, such as a river, stream, pond, lake, wetland, or estuary. In other parts of the world, the terms "catchment" or "basin" are also used to describe the lands and waters that drain into a specific body of water.



This illustration shows an entire watershed system, including rain fall and subsurface activity. It helps demonstrate how land use can have an effect, and be affected by, water quality in a watershed.

Illustration: Jim Taylor, DCR staff

DCR's Office of Watershed Management has a legislatively mandated mission to "protect, preserve and enhance the environment of the Commonwealth and to assure the availability of pure water for future generations." That translates into DCR managing the drinking source water supplies that the Massachusetts Water Resources Authority (MWRA) treats and distributes to more than 2.5 million people in 51 communities.

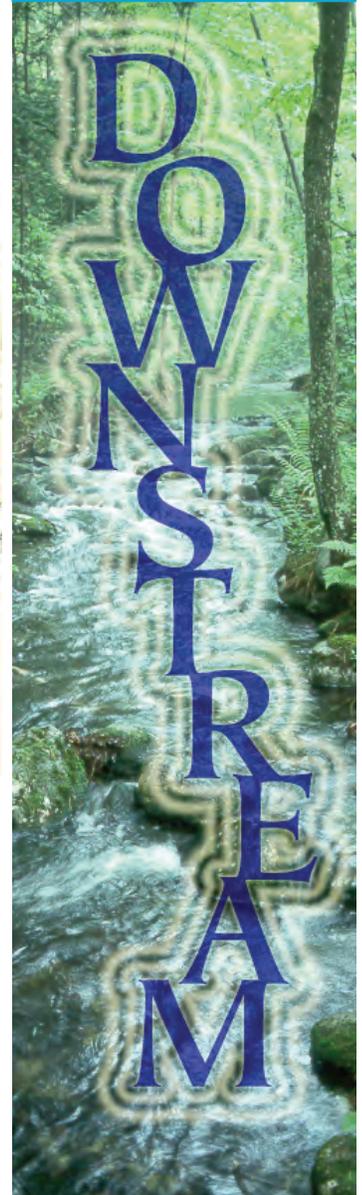
WATERSHED - SEE PAGE 4

In This Issue:

The lead story in this issue provides an overview of how water collects in nature and DCR's efforts to protect its quality for drinking. Other topics covered in this issue are the first detection of the Zebra Mussel in the state and the rising awareness for the proper disposal of unwanted medicines. The latter two articles have suggestions on ways everyone can help protect drinking water quality.

Watershed Management	1
<i>How DCR protects a water supply</i>	
The Zebra Mussel	2
<i>A threat to Massachusetts waters</i>	
Disposal of Unused Pharmaceuticals	3
<i>How to keep them out of drinking water</i>	
Reservoir Watch	3
<i>Water supply facts from the summer</i>	
Watershed Word Find	7
<i>A Kids Corner activity</i>	
Support Land and Water Conservation	8
<i>The new "Tree Plate"</i>	

dcr
Massachusetts



NUMBER 22
Fall 2009

Department of Conservation and
Recreation
Division of Water Supply
Protection
www.mass.gov/dcr/watersupply.htm

Zebra Mussels Found in Massachusetts

Help Stop the Spread of This Notorious Invasive



If you see this sign, PLEASE read it-then heed it!

DCR Archives

This past summer, zebra mussels were found in Laurel Lake in Lee, the first time *Dreissena polymorpha* had ever been seen in Massachusetts waters. They are considered among the most significant invasive species in the United States, causing major ecological and infrastructure damage that costs billions of taxpayer dollars per year to control.

The zebra mussel is a freshwater bivalve mollusk that looks like a small clam with a yellowish or brownish shell shaped like the letter "D." Typically an inch or less in size, they have been found in numbers as high as 750,000 individuals per square meter. These mussels out-compete native mussel species and juvenile fish for microscopic plankton, endangering native species with extinction and upsetting the entire food chain. They attach by the thousands to virtually everything in a water body—including docks, boats, navigation markers, and even other aquatic organisms. Microscopic juvenile zebra mussels can enter and grow in boat cooling systems, water intakes, monitoring equipment, or other underwater machinery, completely clogging these structures. Their razor-sharp shells wash up on shore, creating a safety hazard for beachgoers as well as producing a foul odor as they decompose.

Once the mussels invade a body of water, there is no known way to eradicate them. Zebra mussels were first found in the U.S. near the Great Lakes in 1988 and have since spread to water bodies in about half of all states, including New York, Vermont, and Connecticut. Massachusetts lakes currently most at risk are in Berkshire County's Hoosic and Housatonic watersheds.

Upon their discovery in Laurel Lake, DCR implemented the protocols laid out in the *Rapid Response Plan for Zebra Mussels* developed in 2005 by the agency's Office of Water Resources. DCR notified the Department of Fish and Game's (DFG) Office of Fishing and Boating Access, which has authority over state boat ramps. DFG closed Laurel Lake's public access boat ramp on July 8 in order to reduce the risk from boats that had

recently been on the lake and could transport zebra mussels. After a month of public outreach to increase awareness on zebra mussels and actions people can take to prevent their spread, DFG extended the Laurel Lake boat ramp closure through the end of the 2009 boating season. The closure will provide the state sufficient time to fully implement the range of actions called for in a new *Interim Zebra Mussel Action Plan*.

Keeping zebra mussels out of a water body is crucial because there is no proven method of eradication. Boaters' diligence to clean, drain, and dry equipment is critical to keeping this invasive species from colonizing other Massachusetts waters. A core component of the *Interim Zebra Mussel Action Plan* requires self-certification by every user that their boat has not been on Laurel Lake or other out-of-state water bodies known to contain zebra mussels, or if it has, that the boat has been properly decontaminated.

Surveys are underway to gauge the full extent of the zebra mussel's impact in Berkshire County. DCR and DFG, in cooperation with state and local stakeholders, are also evaluating the *Interim Zebra Mussel Action Plan* to assess how the current measures are working, determine whether modifications to the plan are needed, and update the text and provisions of the plan to reflect any new and pertinent information related to zebra mussels, including ecology, best management practices, laws, regulations, management measures, and educational materials.

ZEBRA MUSSELS - SEE PAGE 6

Although small in size, the rate at which the Zebra Mussel multiplies is a major threat to any waterbody in which it can flourish.



Quabbin Visitors Center

Proper Disposal of Unused Pharmaceuticals

Reduce water pollution and promote a healthy environment by properly disposing of unneeded or expired medications

Prescription and over-the-counter medications are a source of pollution when they are flushed down the toilet or drain. Wastewater facilities and septic systems are not currently designed to process pharmaceutical products. Compounds passing through these systems can impact surface waters, groundwater, and drinking water supplies. Pharmaceuticals can also be released into waterways via stormwater run-off from fields applied with manure or biosolids.

reach streams, rivers, and lakes do affect wildlife, as fish and wildfowl face continuous exposure to the drugs. Medications thrown haphazardly in the trash can also be eaten by wildlife that frequent landfills.



Modern technology can detect more substances, at lower levels, than ever before. Fortunately, tests done in the spring of 2008 detected no compounds in Boston's source drinking water that comes from the Wachusett and Quabbin Reservoirs. According to the American Water Works Association, research has not demonstrated an impact on human health from pharmaceuticals at the very low levels reported nationally in some drinking water supplies. Studies have shown, however, that medicines that

Guidelines for Proper Disposal

These guidelines are taken from the White House Office of National Drug Control Policy, the Department of Health and Human Services, and the Environmental Protection Agency:

- ◆ Take unused, unneeded, or expired prescription drugs out of their original containers.
- ◆ Remove ALL personal identification or prescription labels from the container before placing in the trash.
- ◆ Mix the prescription drugs with an undesirable substance, like used coffee grounds or kitty litter, and put them in impermeable, non-descript containers, such as empty cans or sealable bags, further ensuring that the drugs are not diverted or accidentally ingested by children or pets.
- ◆ Throw these containers in the trash.

PHARMACEUTICALS - SEE PAGE 6

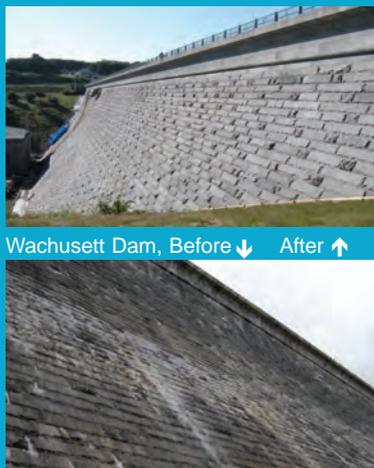
Reservoir Watch - Cleaning the Face of Wachusett Dam

MWRA contractors have been busy all summer cleaning the face of Wachusett Dam. The dam face had an accumulation of efflorescence resulting from the weeping of calcium salts in mortar over the last 100 years. In addition to being

unsightly, the efflorescence was contaminated with PCBs from the caulking used on the dam promenade (see *Downstream* #21). Contractors removed the efflorescence with high pressure water. The work was done under

containment and the water collected and treated. The next steps are to repoint some areas of the face and perform soils remediation. The fence will come down soon so DCR maintenance crews can groom the grounds.

- John Gregoire, MWRA Reservoir Operations Program Manager



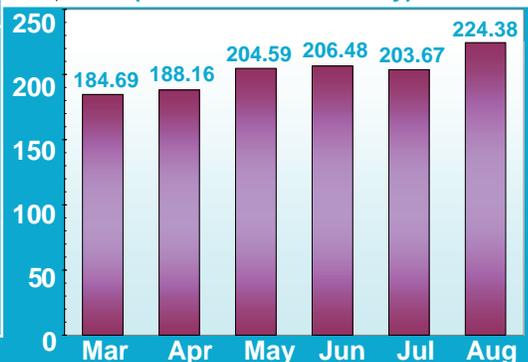
Wachusett Dam, Before ↓ After ↑

Reservoir Levels and 6-month Precipitation (March 2009 to August 2009)

Reservoir	Quabbin	Wachusett
Minimum*	529.29'	388.67'
Percent Full	98.6%	87.2%
Date	6/16/09	3/1/09
Maximum*	530.44'	392.72'
Percent Full	100.9%	95.3%
Date	4/7- 4/11/09	7/26/09
Precipitation	32.61"	24.91"
Seasonal Avg.	25.19"	23.21"

*Reservoir Depth in Feet Above Mean Sea Level

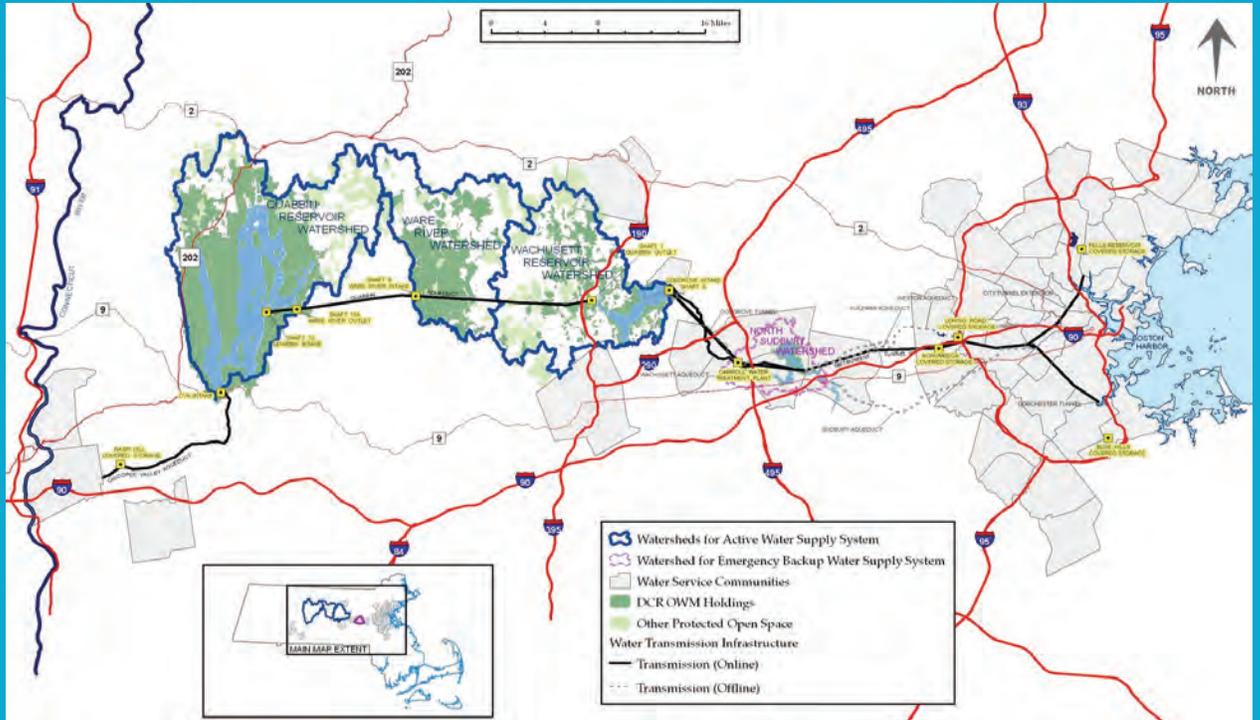
2009 System-wide 6-Month Water Usage (Million Gallons Per Day)



Data: Matt Walsh, MWRA Project Engineer

The DCR Watershed System

This map shows the central portion of the state containing the DCR watershed system. Watershed boundaries are outlined in blue (active) or purple (emergency). Treatment and distribution are provided by MWRA.



DCR/DWSP GIS

WATERSHED- FROM PAGE 1

DCR’s watershed management is tailored to four specific bodies of water: the Quabbin Reservoir, the Ware River, the Wachusett Reservoir, and the Sudbury Reservoir (see figure above). The first three watersheds comprise the active water supply, while the Sudbury (which also includes Foss Reservoir) is an emergency source of drinking water. These watersheds are not small: they encompass close to 400 square miles, all or part of 31 communities with a population of around 270,000 people (most towns are not completely within the

watershed boundaries, and there is only a small portion of Worcester and Leominster), miles of roads and railroad tracks, and a wide array of wildlife within a mostly forested landscape (see Tables 1 and 2).

The legislatively defined mission is a very broad mandate. DCR pursues a deliberative, reiterative planning processes to help guide the work of 150 staff employed by the Office of Watershed Management. The public have opportunities to comment on the management of these resources, particularly while the agency updates

each watershed’s Public Access and Land Management Plans as well as the yearly review of forestry activities at Quabbin.

DCR works closely with MWRA to develop an Annual Work Plan that is approved by the Water Supply Protection Trust. The Work Plan provides both a budget and a detailed description of the wide array of tasks performed by DCR to maintain water quantity and quality for the water supply system. MWRA is required by legislation to fund DCR Watershed activities; for FY2010, that includes a \$13.7 million operation budget,

TABLE 1: DCR/DWSP Watershed System Acreage

	Watershed	Reservoir Area	Land Area	Total Area
Active System	Quabbin Reservoir	24,469	95,466	119,935
	Ware River	0	61,737	61,737
	Wachusett Reservoir	4,122	70,678	74,800
Reserve System	Sudbury Reservoir	1,215	13,153	14,368
	Foss Reservoir	217	3,197	3,414

Source: DCR

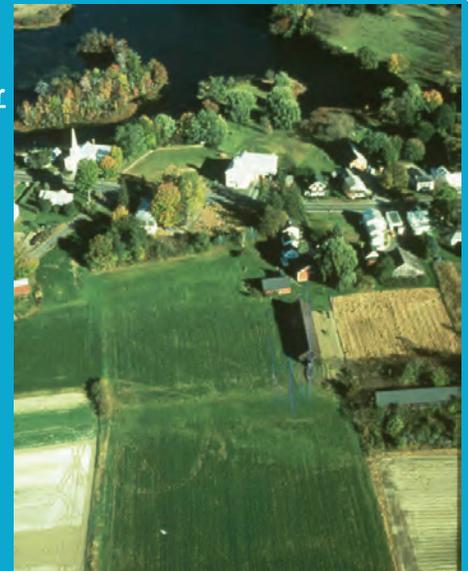


Rainfall on upland acreage filters through the land collecting in rivers and streams, like this tributary to the Ware River, and then into the reservoir system.

TABLE 2: Land Use in the DCR/DWSP Watershed System (in percent)

<u>Watershed</u>	<u>Forest</u>	<u>Wetland</u>	<u>Farming</u>	<u>Residential</u>	<u>Comm./ Industrial</u>	<u>Open Water</u>	<u>Other</u>
Quabbin	90.7	2.3	2.3	1.8	0.1	0.5	2.1
Ware River	81.0	3.1	3.7	5.0	2.0	2.5	3.1
Wachusett	70.2	1.2	7.3	13.1	1.6	2.2	4.4
Sudbury (Reserve)	38	1	5	28	11	8	8

Source: MassGIS



Land use and the permeability of the ground has an effect on how long the water remains on the lands as well as how well the natural filtration process works.

TABLE 3: Summary of Protected Lands in the DCR/DWSP Watershed System (in acres)

<u>Watershed</u>	<u>DWSP Owned</u>	<u>DWSP WPR</u>	<u>Other Protected</u>	<u>Total Protected</u>	<u>Land Area</u>	<u>% of Land Protected</u>
Quabbin	53,220	830	13,589	67,639	95,466	70.8
Ware River	23,313	824	6,533	30,670	61,737	49.7
Wachusett	16,658	2,230	12,502	31,390	60,678	44.4
Total	93,191	3,884	32,624	129,699	227,881	56.9
Sudbury (Reserve)	2,382	0	1,715	4,097	16,350	25.1

WPR = Watershed Protection Restriction, synonymous with Conservation Restriction

Source: DCR and MassGIS

\$3.8 million in bond money for land acquisition, and \$6.5 million for Payments in Lieu of Taxes.

The Work Plan is organized into 14 programs arranged by four main goals, as seen in Table 4 on the right. DCR is proud of its watershed management record. It is the foundation of the unfiltered metropolitan Boston water supply, recognized internationally for its superior water quality. *Downstream* has highlighted many of these successful programs, and will continue to share more stories on watershed management topics in future issues. 💧

-Joel Zimmerman, DCR/DWSP Regional Planner



Calculations indicate that it takes seven years for water to travel from the Quabbin watershed boundary to the distribution intake.

Table 4: DCR Office of Watershed Management Goals and Programs

<u>GOAL</u>	<u>PROGRAM</u>
Protect land through ownership or agreement.	1. Land Procurement 2. Land Preservation (Watershed Protection Restrictions)
Manage DCR-owned properties to protect and enhance water quality, and provide stewardship of natural resources.	3. Land Management 4. Wildlife Management 5. Public Access Management 6. Watershed Security 7. Infrastructure
Work with watershed communities to foster watershed protection principles on land in private ownership.	8. Watershed Protection Act 9. Technical Assistance and Community Outreach 10. Interpretive Services
Monitor to identify potential or existing water quality problems.	11. Water Quality Monitoring 12. Environmental Quality Assessments a. Compliance with Environmental Regulations b. Wastewater Management c. Stormwater Management d. Agriculture e. Hazardous Materials 13. Emergency Response
	14. Administrative Support

PHARMASEUTICALS- FROM PAGE 3

Medicine Disposal Concerns

Medicines that are flushed down a toilet or sink contaminate water resources, resulting in reproductive and developmental problems in fish and other aquatic wildlife.

Improperly discarded containers provide personal information that can be used illegally, including identity theft.

There is the possibility of poisoning from accidental ingestions, particularly by small children and pets, if medicines are thrown “as is” in the trash or unneeded or expired medicines are kept in the house. 💧



-Kelley Freda, DCR/DWSP
Environmental Analyst

**DO NOT DISPOSE OF
MEDICATIONS
DOWN THE TOILET!***

***The Food and Drug Administration advises, however, that the following medications have a high abuse potential and should be disposed of by flushing down the toilet rather than in the trash.**

- Actiq (fentanyl citrate)
- Daytrana Transdermal patch (methylphenidate)
- Duragesic Transdermal System (fentanyl)
- OxyContin Tablets (oxycodone)
- Avinza Capsules (morphine sulfate)
- Baraclude Tablets (entecavir)
- Reyataz Capsules (atazanavir sulfate)
- Tequin Tablets (gatifloxacin)
- Zerit for Oral Solution (stavudine)
- Meperidine HCl Tablets (Percocet, Oxycodone, and Acetaminophen)
- Zyrem (Sodium Oxybate)
- Fentora (fentanyl buccal tablet)



Proper disposal of unwanted medicines will help to ensure that water, like that of the Quabbin Reservoir shown above, will remain clean and clear.

ZEBRA MUSSELS - FROM PAGE 2

**Help Stop the Spread
of the Zebra Mussel!****When Loading Your Boat Back
On the Trailer...**

Inspect and clean your boat, trailer and gear. Remove any mud or plant remnants. Feel the smooth surfaces of your boat hull for rough or gritty spots, which may be young mussels that have attached to your boat to begin their destructive cycle. Scrape off any mussels you find. Crush them and dispose of the remains in the trash. Empty and dry all buckets. Dispose of all bait in trash receptacles before leaving the area. Do not take bait home or leave it on the ground.

When Arriving Home...

Drain any remaining water from boat bilges, ballast tanks, live wells, intakes, and engine cooling systems. Adequate drying is the surest way to prevent the spread of the zebra mussel. Ideally, let your boat dry for one week in hot dry weather and up to four weeks in cool damp weather before launching into a different water body. If you can't keep your boat dry, wash the boat (hull, bilge, and exposed surfaces), trailer, lower unit, and any other equipment, and flush the engine, with high-pressure hot water that is at least 140° F or any other

recommended disinfectants that can be found at www.mass.gov/dcr/water/supply/lakepond/downloads/ZebMussBro09.pdf.

When Maintaining Gear...

Thoroughly clean each piece of fishing tackle, sporting equipment, and other boating gear, including nets, life jackets, water skis, tow behinds, lines, and anchors. Divers should be sure to clean all gear, including wetsuits, regulators,

and buoyancy compensators—both inside and outside—using any commercially available dive equipment cleaner that contains ammonia, vinegar, or chlorine. Allow all to dry thoroughly before using it in another water body. Clean and dry personal belongings, clothing, and footwear that has come in contact with the water. Wash, dry, and brush pets that have been in the water. 💧

-Tom Flannery, DCR Lakes and Ponds Program
Aquatic Biologist

ZEBRA MUSSELS AND QUABBIN RESERVOIR

On the same day as the Laurel Lake boat ramp closure, DCR, with strong support from the MWRA Board of Directors, took the precautionary measure of temporarily prohibiting fishermen from using private boats at the Quabbin Reservoir. While water chemistry in Quabbin does not likely support zebra mussels, DCR and MWRA decided that there should be further studies and boat cleaning procedures developed before allowing private boats back on the reservoir, since infestation to the drinking water supply could be devastating.

DCR used dive teams to inspect and test the water and the MWRA infrastructure for zebra mussels; as expected, none were found. After two public meetings in late July, DCR piloted a successful boat decontamination process for a Special Olympics program, allowing the reservoir to re-open to private boats on August 17. The protocol affixes a seal between the

boat and trailer after they are cleaned at an approved location. This seal must be broken prior to any launch; boats without intact seals will not be allowed on the reservoir. A new seal will be fastened upon leaving Quabbin. If the boat is used in any other body of water, thus breaking the intact seal, it will require another official cleaning to prove that it has passed the approved regimen prior to getting on the reservoir.

DCR appreciates the cooperation and patience shown by boaters at the Quabbin and their understanding of the balance between public access and the importance of protecting the water supply for 2.5 million people. The new protocol was a first step covering the remainder of the 2009 fishing season while the agency develops a long-term plan to allow the continued use of private boats on the Quabbin.

**For More Information
About**

Watersheds

MA Dept. of Conservation and Recreation:
www.mass.gov/dcr/watersupply.htm
EPA Surf Your Watershed:
www.epa.gov/surf
Massachusetts Watershed Council:
www.commonwaters.org

Zebra Mussels

For information or to report a Zebra Mussel sighting, call the DCR Lakes and Ponds Program at (617) 626 4975 or visit www.mass.gov/dcr/watersupply/lakepond/lakepond.htm

Proper Medicine Disposal

MA Dept. of Environmental Protection:
www.mass.gov/dep/toxics/stypes/ppcpedc.htm
MA Water Resources Authority:
www.mwra.com/04water/html/pharmaceuticals.htm
SMARxT Disposal:
www.smarxtdisposal.net
US Environmental Protection Agency:
www.epa.gov/ppcp
White House Office of National Drug Control Policy:
www.whitehousedrugpolicy.gov/publications/pdf/prescrip_disposal.pdf

And Another Thing...

by J. Taylor



"Does This Water Taste Funny?"

Kids Corner

Watershed Word Find

Find the listed words in the puzzle below.

They can be forward, backward, up, down, or diagonal. Good luck!

Word list

- | | |
|--------------------|----------------------|
| AQUIFER | INVERTEBRATE |
| BASIN | PRECIPITATION |
| DAM | RESERVOIR |
| DIVIDE | RIVER |
| DROUGHT | RUNOFF |
| EVAPORATON | TRANSPORATION |
| FLOOD | TRIBUTARY |
| GROUNDWATER | WATERSHED |
| HYDROLOGY | WATERTABLE |



W R E V I R G L Q T O A D H K L M X C E D H W Z
 A S D G L C W Y F T H G U O R D H L E Y I X E K
 T W A T E R S H E D G E A Q U I F E R W D S Y N
 X E R S O L Y G O L O R D Y H D Y N A M E G N O
 C V G R Y H I N V E R T E B R A T E M S O P X I
 V A W A H I G U H A N C N Q V M I L Z W P C A T
 W P W A T G R O U N D W A T E R M I V I T P U A
 D O S I T R I B U T A R Y F I S W T S L U S B T
 T R A N S E P R I O V R E S E R D Y M U I A N I
 R A D I W Y R Y N O F F W B L Q I H N P S N E P
 A T Q R S T A T X P A E A W Y K V L N I R Y A I
 H I W Z A H T R A N S P O R A T I O N A C R I C
 G O A R T I Q X T B K A R L B A D A R J I V L E
 T N S A G H W A T E L M G A K C E P H W Y M F R
 N D O O L F J S T R A E R U N O F F Y G Z L N P

Support Land and Water Conservation

The Massachusetts Environmental Trust is launching a new "Land and Water Conservation" license plate that will support the conservation of land critical to the protection of the Commonwealth's water resources. Similar plates in other states have conserved tens of thousands of acres in recent years. This new land conservation tool is needed more than ever.

Development near our lakes, ponds, rivers, and coasts - and the fertilizer, storm water run-off, and other non-point source pollution it brings - is the greatest single threat to Massachusetts waters.

Conservation and protection of supporting land is the most effective strategy for protecting the region's water quality, fish, and other rare aquatic species and habitat. Protecting buffers along our rivers, lakes, and ponds is essential to keep these waters clean for drinking water, recreation, and wildlife.

Proceeds from the new Land and Water Conservation license plate will be segregated in a separate fund dedicated to the acquisition, stewardship, and restoration of land affecting 9,000 miles of streams and rivers, 1,100 lakes and ponds, and more than 1,500 miles of coastline - of which many thousands of acres are unprotected. By purchasing this plate, you help protect core terrestrial and wetlands habitat and other priority watershed areas.



For more information
and to reserve your plate, go to
www.MassEnvironmentalTrust.org

The Massachusetts Environmental Trust protects the lakes, rivers, and coastal waters of Massachusetts. Proceeds from the Trust's Right Whale, Brook Trout, and Blackstone Valley Mill plates have funded over \$16 million in water protection initiatives throughout the Commonwealth.

DOWNSTREAM

Department of Conservation & Recreation
Division of Water Supply Protection
Office of Watershed Management
180 Beaman Street
West Boylston, MA 01583

(508) 835-4816 ex.363

Downstream is produced twice a year by the Massachusetts Department of Conservation and Recreation, Division of Water Supply Protection. It includes articles of interest to residents of the watershed system communities. Our goal is to inform the public about watershed protection issues and activities, provide a conduit for public input, and promote environmentally responsible land management practices.

Governor:	Deval L. Patrick
Lt. Governor:	Timothy P. Murray
EOEEA Secretary:	Ian A. Bowles
DCR Commissioner:	Richard K. Sullivan Jr.
DWSP Director:	Jonathan L. Yeo
<i>Downstream</i> Editor:	James E. Taylor

