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of Conservation and Recreation
Division of Water Supply Protection
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Unwanted Guests



Aquatic invasive species foul the state's water bodies

By Paula D. Packard
DCR Aquatic Biologist

While quietly paddling a canoe along the shoreline of the Sudbury Reservoir, checking the diversity of plant life, my fellow aquatic biologist and I noticed an unfamiliar island come into view up ahead. Having visited the area many times, we wondered how this could be since there was never an island there before. Suddenly, we realized what we were looking at was not an island at all, but a huge mass of invasive Water Chestnut plants clumped together on the surface of the water!

Invasive species have been a concern to environmentalists for years, but now it seems they are coming at us at a fast and furious rate! The list of invasive species grows almost as quickly as some of the species themselves, once they are introduced in new territory.

What exactly is an invasive species? The term "invasive species" is used to describe any organism that is introduced into an area where it is not normally found; it often out-competes native or

naturally occurring plants or animals. Invasive species that pose the greatest threat typically come from places where the climate and conditions are very similar to ours. They are already adapted to cold, harsh winters and seasonal changes so the transition to our area is simple for them.

In their new location, invasive species encounter few predators or naturally occurring diseases. They are usually not recognized as a food source by other species. Invasives may crowd out similar native species, use up available nutrients, and, in extreme cases, out-compete rare species, causing local extinctions. When free from the checks and balances of their place of origin, their populations may increase uncontrollably, giving them unfair competitive advantage.

Unfortunately, once introduced, eradication can be expensive, time consuming, or even virtually impossible. The best way to keep invasive species at bay is to prevent their introduction in the first place. Simple as this may sound, careless or uninformed behavior can easily bring this about. This article presents a few of the aquatic invasive species that are of top-most concern to the State's natural resource managers.

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Wachusett Watershed Rangers Say Hello



By Rebecca Baronoski
DCR Wachusett Watershed Ranger

Spring is finally here! After a long and cold winter – and very wet March – it’s time once again to think about getting outdoors and enjoying the wonders that surround us. A great way to take in the nice weather is to participate in the Wachusett Watershed Rangers 2010

interpretive programs. The Wachusett Watershed Rangers will be conducting a series of fun and educational programs that span from learning how to fish to exploring old cellar holes. All of these programs are designed to educate visitors and watershed residents about watershed protection and environmental stewardship. So come on down to the Wachusett Reservoir, bring your friends and family, and let the Rangers share with you the history and

knowledge that the watershed has to offer.

Be sure to look forward to the fall edition of *Downstream*, when a new regular feature by the Wachusett Rangers will be introduced that covers both what we do and why we do it. There will also be an “Ask the Ranger” column that will answer the inquisitive public’s questions. Please email rebecca.baronoski@state.ma.us to submit a question and look for a reply in the next issue of *Downstream*. ♦



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2010 Ranger Programs

May 8: 10:00 a.m. WAUSHACUM PARK TOUR

Join the Rangers and the Sterling Historic Society for an approximate mile-long walking tour of the site of the former Waushacum Park. This park was once a number one destination for company picnics and rail-going vacationers. The merry-go-round, dance hall, steam boat, and other attractions were dismantled by the state in the early 1900s to protect the water quality of the Wachusett Reservoir. Meet at the Gates Rd. Rail Trail parking lot in Sterling.

June 5: 9:00 - 11:00 a.m. LEARN TO FISH

This program will focus on fishing techniques, species that live in the reservoir, the importance of keeping the water clean (lead and mercury free), and being an environmentally responsible angler. A group fishing license as well as fishing poles and tackle will be provided by the MA Department of Fish and Game. Meet at the Old Stone Church on Beaman Street in West Boylston.

June 19: 9:00 - 11:00 a.m. INTRODUCTION TO FLY FISHING

This program will include an introduction on the basic equipment needed to get started, basic fly casting lessons, and techniques used for fly fishing. Rods and ties will be available for use

but feel free to bring your own equipment. At the conclusion, participants will have a chance to use their newly learned skills on the Quinapoxet River. Bring along waders if you wish to fish above the dam. Meet at the MWRA Facility, 51 River Rd., West Boylston.

July 24: 1:00 p.m. PROTECTING YOUR WATERSHED

Ever wonder why dogs aren't allowed on watershed land? Or why DCR staff harasses gulls off the reservoir waters? Watershed Rangers will answer all of these questions and more. Learn about the steps you can take toward watershed protection and water conservation.

The program will also provide an overview of the primary function of each section of the DCR Watershed Management Division, a tour of the MWRA facility, and a water quality demonstration. Meet at the MWRA Facility, 51 River Road, West Boylston.

August 21: 10:00 a.m.-2:00 p.m. WATERSHED GEOCACHING

All are invited for a fun day of Geocaching at the Wachusett Watershed. Adults and families are welcome to come and locate caches at historical and scenic locations. Please bring your GPS and a sense of adventure.

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May Heralds National Drinking Water Week

By Kelley Freda
DCR Environmental Analyst

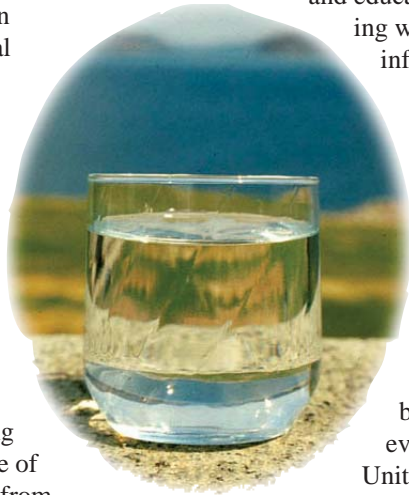
May 2nd to 8th was National Drinking Water Week! Every year, the American Water Works Association (AWWA) and an alliance of organizations, including the U.S. Environmental Protection Agency, sponsor National Drinking Water Week to highlight the importance of tap water and the need to invest in our nation's drinking water infrastructure. A safe, reliable water supply is critical to the success of any community, creating jobs, attracting industry and investment, and providing for the health and welfare of citizens in ways ranging from disease prevention to fire suppression. A clean, abundant water supply is often taken for granted until it is threatened, either by drought, water main breakage, or some other catastrophic event.

Drinking Water Week has been a custom for more than 50 years. The AWWA marked this celebration for the first thirty years with just its members. In 1988, AWWA brought the event to the attention of the federal government, culminating in a joint congressional reso-

lution signed by then-President Ronald Reagan declaring the first week of May as National Drinking Water Week. Since that time, National Drinking Water Week has been observed throughout the United States and Canada, evolving into a week for water utilities to highlight their work and educate the public on drinking water, water quality, and infrastructure issues.

Drinking Water Week is also a great time for teachers to educate their students on ways to protect and conserve our resources. For example, did you know that water utilities in the United States treat nearly 34 billion gallons of water every day? Or that in the United States and Canada, the total miles of water pipeline and aqueducts equal approximately one million miles...enough to circle the globe 40 times?

Americans drink more than one billion glasses of tap water a day. Do you know where your water comes from when you turn on the faucet? In the Wachusett Reservoir watershed, residents of Sterling, West Boylston, most of Holden and Boylston get their public drinking water



Continued on Page 6

DCR Wins National Source Water Protection Award

DCR's Division of Water Supply Protection, Office of Watershed Management has won the most prestigious award for water supply protection in North America - the Exemplary Source Water Protection Award for large systems from the American Water Works Association. This award was based on three criteria: the effectiveness of the program; the innovativeness of the program approach; and the difficulties overcome by the organization in satisfying the eligibility criteria.

Several of the factors for granting the award were:

- A well established working relationship between DCR and the MA Water Resources Authority (MWRA), as well as the use of the Water Supply Protection Trust as a funding mechanism.
- Extensive citizen input through advisory committees.
- Creation of a comprehensive protection program that includes Watershed Protection Plans, Land Management Plans, and Public Access Plans.
- Maintenance of excellent source water quality required for a filtration waiver.
- Successful implementation of the Watershed Protection Act.
- Land acquisition that utilizes a GIS-based prioritization model.
- Active forest management specifically designed for water supply protection.
- Water quality monitoring that details program effectiveness.
- Innovative programs such as: microbial tracking to identify dog waste as a problem coupled with a program to change behavior on waste disposal; emergency response training and equipment deployment (with MWRA); Watershed Ranger outreach; assistance with bylaw development; and operation of the Quabbin Visitor's Center.

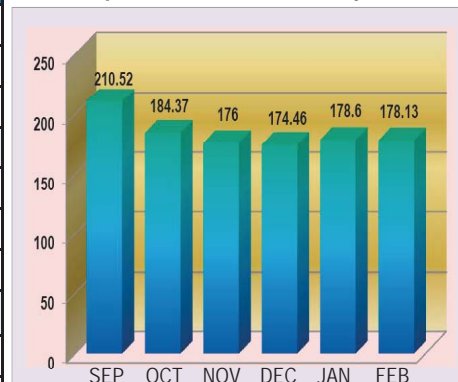
Look for more information on these topics and more in past and future editions of *Downstream*.

Reservoir Watch

Reservoir levels and 6-month precipitation

Reservoir	Quabbin	Wachusett
Minimum	526.84'	389.81'
% Full	94.1%	89.5%
Date	11/19/09	12/3/09
Maximum*	528.82'	392.80'
% Full*	97.8%	95.6%
Date	2/28/10	2/28/10
Precipitation	18.8"	18.84"
Seasonal Avg	23.11"	22.23"

System-wide 6-month Water Usage (in million gallons per day) September 2009 to February 2010



* Both reservoirs were over-capacity by mid-March. Quabbin reached maximum elevation of 530.58' (417.2 billion gallons of water in storage) and Wachusett peaked at 396.35' (67.5 billion gallons of water in storage). See story on page 8.

Aquatic invasive species foul the state's water bodies



Zebra mussels, though small, can cause significant damage to underwater equipment.

From Page 1

Zebra Mussels (*Dreissena polymorpha*) were first found in North America in 1985 at the Great Lakes. Native to the Black, Caspian, and Aral Seas in Eastern Europe, they were most likely introduced in ballast water released from cargo ships. Since that time they have spread, colonizing many water bodies in the United States, causing considerable economic loss as well as severe impairment of native ecosystems. In the summer of 2009, Zebra Mussels were discovered in western Massachusetts. Due to the level of potential damage they can cause, this little mollusk has quickly become the “poster child” for aquatic invasive species. They are of



Spiny water fleas can coat fishing lines, making riggers so heavy that the lines must be cut.

great concern to water suppliers because they affix themselves in great numbers to any hard surface and then grow, clogging intake systems and distribution pipes, costing exorbitant amounts of money to correct. This threat is also very real to boaters or anyone else with machinery or equipment in affected waters.

In the food chain, Zebra Mussels are filter feeders. They filter algae out of the water, depleting the food source of many small organisms, thereby disrupting the food chain from the bottom

up. Clarity of affected waters

may actually increase, allowing sunlight to penetrate deeper, thus increasing the growth of rooted aquatic plants, some of which may also be invasive.

Female Zebra Mussels can produce hundreds of thousands of eggs every year. The larval stage of the Zebra Mussel, called veligers, are microscopic and freely float throughout a water body. After about 2 to 4 weeks, they begin to develop a shell and will attach to any suitable substrate, such as rocks, logs, man-made structures, and even living crayfish or turtles. Veligers are very often unknowingly introduced to other locations in live well, bilge, or bait bucket water that is transferred from one water body to another.

Fortunately, the water chemistry at the Quabbin and Wachusett Reservoirs is not considered conducive to Zebra Mussel survival. However, this does not mean that we should passively assume that they cannot become established. As a result, the DCR is vigilantly working to keep Zebra Mussels, as well as all known invasive spe-

cies, from entering our waters.

The Spiny Water Flea (*Bythotrephes longimanus*) is a type of zooplankton similar to some of our native species, however they have a long tail equipped with spines (thus their name) so few fish find them palatable. The Spiny Water Fleas compete with small fish for food, therefore harming fisheries. During the day, they migrate down into the deep, darker water to further avoid predation then come back up to the water's surface at night to feed. Females are parthenogenic at times, meaning they can reproduce without a male counterpart. They also produce what are called resting eggs that are able to withstand drying. In

large numbers, Spiny Water Fleas may coat fishing line and down riggers becoming so heavy that the line must be cut. Due to this problem, a new type of fishing line called “flea flicker” is being marketed. Spiny Water Fleas

DCR staff regularly monitor for the presence of invasive species including Didymo, Spiny water flea, Zebra mussels, as well as many plants.

are often transported in water like Zebra Mussel veligers, but also on carpeted wheel wells and trailer bunks, and on felt-soled waders. These areas provide some moisture and protection that may harbor resting eggs. Few predators, efficient reproductive strategies, and the ability to withstand drying drastically increase the threat of Spiny Water Flea's successful colonization of new areas.

Didymo (*Didymosphenia geminata*, also called “rock snot”) is a member of a common group of algae known as diatoms. Didymo typically prefers flowing water; however, there is some evidence that it is adapting to different habitats. Didymo forms a thick, sticky mat that smothers other organisms. It can also withstand long periods of partial drying. Like the other invasives in this article, it is most often transported to new locations on felt-soled waders used by fishermen, on



Didymo, otherwise known as “rock snot,” forms a thick, sticky mat that smothers other organisms.

equipment or in water that is transferred from one body of water to another. Once established, it is impossible to eradicate. This invasive was first found in northern New England in 2007. DCR is closely monitoring for the arrival of Didymo; to date it has not been found in the reservoir system.

Some of the invasive aquatic plants that concern DCR biologists include **Fanwort** (*Cabomba caroliniana*), **Eurasian Water-milfoil** (*Myriophyllum spicatum*), **Hydrilla** (*Hydrilla verticillata*), **Common Reed** (*Phragmites australis*), and **Water Chestnut** (*Trapa natans*). Invasive plants crowd out native plants and compete for available nutrients. Like the animal species, invasive plants also have few predators so they will grow unchecked. As they multiply, biomass increases, eventually degrading water quality by adding excess nutrients. Some invasive plants such as Eurasian Water-milfoil spread by fragmentation, where small pieces of the plant break off, float to new areas and take hold. Water Chestnut reproduces by growing nuts that can float for some distance, sink to the bottom, and then germinate. The rosette of floating leaves of this plant forms a dense mat on the water’s surface that blocks the sunlight from reaching any plants that may try to grow beneath it. Water Chestnut is an annual plant so infestations respond well

to hand harvesting over several years. Hand harvesting is being used to control Water Chestnut at the Sudbury Reservoir and Fanwort and Eurasian Water-milfoil at the Wachusett Reservoir. At this time, none of these invasive plants are present in Quabbin Reservoir.

What is DCR doing about invasive species?

DCR staff regularly monitor for the presence of invasive species including Didymo, Spiny Water Flea, Zebra Mussels, as well as many plants. An extensive boat inspection and decontamination

program has been implemented at the Quabbin Reservoir. State-wide, a comprehensive plan to address invasive species is under development as we continue to provide outreach and public education. While no program can ensure complete protection, the steps we have taken dramatically reduce the threat of aquatic invasive species.

What can you do? Be a part of the solution! Clean boats, equipment, fishing gear, clothing or any other material that is brought from one body of water to another, especially if traveling from a place that is known to be infested with any invasive species. Educate yourself and learn to recognize and identify invasive species (a great place to start is DCR’s Lakes and Ponds program, which offers hands-on Weed Watcher classes as well as a wealth of information on-line at www.mass.gov/dcr/watersupply/lakepond/lakepond.htm). Immediately report any invasive you may find. Please be vigilant and cooperate with DCR’s efforts to protect our valuable



Fanwort, having few predators, can out-compete native plants.



Eurasian Water-milfoil is becoming a hazard in many of the state’s water bodies.



While rooted in water, *Phragmites* interferes with native shore plants.

natural resources from the steady stream of invasive species. 💧

2010 Wachusett Watershed Ranger Programs

From Page 2

The event will be posted on www.geocaching.com. Meet the Rangers at the DCR Division of Water Supply Headquarters, 180 Beaman St., West Boylston. Participants will be given the coordinates to seven different locations within the watershed. Sites will vary in terrain so visit as many or as few as you like. Locate them all and win a prize!

September 11: 11:00 a.m. WACHUSETT RESERVOIR HISTORY

Come and meet the Rangers and hear all about the history behind the Wachusett Reservoir. Learn how and why the reservoir was constructed in the Nashua River Valley over 100 years ago. Listen to spooky legends and fun facts about the reservoir. There will be a slideshow presentation inside the Old Stone Church as well as a display of actual photographs taken before and during the reservoir construction. Bring a chair along if you would like to sit. Meet at The Old Stone Church on Beaman Street in West Boylston



Scouts gather together with Watershed Rangers for the annual Chuckwagon Derby.

September 25: 10:00 & 1:00 p.m. SPRINGDALE MILL DAY RANGER BIKE TOUR

Wachusett Greenways will be hosting their annual Springdale Mill Day. During this event, the DCR Rangers will be offering an interpretive bicycle tour of the area. Rangers will take participants on a bike ride stopping at points of interest along the way to the historic Springdale Mill site. This program is designed to educate the general public in the uses, responsibilities, and benefits of living in a protected watershed. Please bring your own bike, helmet, and water. Meet at the Mass. Central Rail Trail parking lot in West Boylston.

October 9: 10:00 a.m.

NATURE HIKE

Take a hike with Ranger Nate to explore the natural wonders of the Reservoir. He will lead a 1½ hour hike exploring the watershed and talking about why and how DCR protects the land for water quality. Please bring comfortable shoes, water, and your questions about the watershed. Meet at Reservoir Gate 22, Route 140, West Boylston.

October 23: 10:00 a.m. - 2:00 p.m. CELLAR HOLES AND STONE WALLS

The rangers and interpretive staff will lead a guided hike into the woodlands surrounding the reservoir and will explore the former homestead sites that once stood in the valley. The rangers will discuss land use changes, reservoir history, and clean drinking water needs. Interpretive staff will explore the stonewalls that surround the area and discuss their history, age, and purpose. Please wear hiking boots or sneakers. Meet at the parking lot at the intersection of Route 110 and Chase Hill Rd. in Sterling. ♠

How to maintain safe water quality

From Page 3

from ground water sources via municipal wells; the Leominster water supply consists of three surface water reservoirs, one ground water supply, and an emergency connection to the Wachusett Reservoir. Several communities that encompass the Quabbin Reservoir and Ware River watersheds, such as Ware, Belchertown, Orange, Athol, Hardwick, and Barre, have some form of public water supply; however, practically every household that is actually within the watershed boundaries is serviced by private wells. The major exception is in Rutland, where a portion of the town gets its drinking water from the Muschapoag Reservoir.

DCR's Office of Watershed Management encourages residents in the DCR/MWRA watersheds to take the opportunity of

Drinking Water Week to learn more about your own drinking water – where it comes from, how it is treated, its quality, and ways you can protect it. For folks who have a municipal supply, a good way to find this information is through the annual Consumer Confidence Report (CCR), a requirement of the federal Safe Drinking Water Act for all community Public Water Systems. These reports, which provide details on water supply and quality, must be delivered to each utility's customers by July 1 for the previous calendar year. The Massachusetts Department of Environmental Protection (MassDEP) is the state agency authorized to implement and enforce drinking water mandates such as the CCR rule.

The Division of Water Supply Protection encourages you to not only learn about your drinking water supply, but

also the water supply for more than 2.2 million residents provided by the Wachusett and Quabbin Reservoirs, and why it is important for residents who live within the watershed system to help protect these vast natural resources. Some ways you can help to maintain safe water quality for both your own drinking water and the metropolitan Boston water supply include: regular maintenance and inspection of septic systems; not flushing unused medications down drains; making sure home heating oil tanks are in good condition; picking up after your pet; and properly disposing of hazardous materials, including used motor oil and household cleaning products (please take advantage of municipal collection events). Sweeping road sand away from storm drains is another small but important way to help protect surface waters. All of your individual actions combined will make a difference in keeping everyone's drinking water pure, for now and into the future. ♠

Kids Corner

Zebra Mussels Multiplied!

By Jim Lafley
DCR Wachusett Section
Education Coordinator

Zebra Mussels (*Dreissena polymorpha*) are small, fingernail-size clams native to the Caspian Sea region of Poland and Russia. The mussels were introduced accidentally by hitching a ride in large, ocean-going ships coming to the United States. The ships add water to ballast tanks before they leave their harbor to help stabilize the ship as it travels. When they unload the water in the new location, the species living in the water are unloaded too.

These mussels can threaten the new ecosystem to which they have been added. As filter feeders they removed small plants (phytoplankton) and small animals (zooplankton) from the water that would provide food for native mussels, clams, and fish.

Zebra Mussels also tend to clump



together as they build a colony. This trait can clog systems in boats and water intake pipes at power plants and water supply facilities.

They are capable of reproducing rapidly. On average a female can produce 30,000 eggs per year, but only about 1% of the offspring survive. The potential for rapid overpopulation is great.

You can figure out how many Zebra Mussels would be produced after just 3 years by using the following information and the chart below:

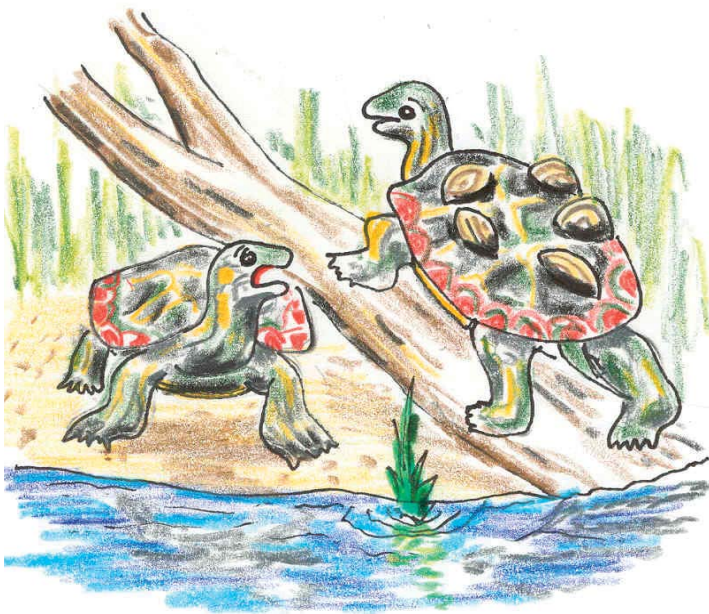
- Begin Year 0 with 2 Zebra Mussels, a male and a female.
- Assume 1% of the 30,000 offspring each Zebra Mussel produces survives.
- At the end of Year 1, there will be 302 Zebra Mussels (300 survivors and the 2 originals)
- Assume ½ the population is female.

Year	Number of Zebra Mussels
0	2
1	302
2	
3	

Year 2 - 45,602 • Year 3 - 6,885,902

And another thing...

by J. Taylor



“When you said you had ‘muscles,’ I thought...

For more information about Aquatic Invasive Species:

DCR Lakes and Pond Program

www.mass.gov/dcr/watersupply/lakepond/lakepond.htm

US Geological Survey Nonindigenous Aquatic Species Program

<http://nas.er.usgs.gov/>

For more information about drinking water:

DCR Division of Water Supply Protection

www.mass.gov/dcr/watersupply.htm

American Water Works Association

www.awwa.org

New England Water Works Association

www.newwa.org

EPA Ground and Drinking Water Program

www.epa.gov/safewater

MA Dept of Environmental Protection

www.mass.gov/dep/water/drinking.htm

MA Drinking Water Education Partnership

www.madwep.org

It's a Hard Rain...That Fell

Unless you were away this past March, you may have noticed lots of rain. The reservoir system was, to say the least, full and then some. At peak runoff times, the Quabbin Reservoir (right), Wachusett Reservoir (far right) and the Sudbury Reservoir (bottom right) were filled to over-capacity. In such cases, the spillway of each reservoir diverts excess water safely downstream: Quabbin into the Chicopee River, Wachusett into the Nashua River, and the Sudbury into the Sudbury River. At maximum flow this spring, Quabbin was spilling 7,333 gallons of water per second – enough to fill a 660,253 gallon Olympic-sized swimming pool in about 90 seconds. At the same time, Wachusett was spilling 24,200



gallons per second – enough to fill that same swimming pool in about 27 seconds, while the flow at the Sudbury Dam could fill the pool in two minutes, 11 seconds!

While we all hope for a long, hot summer, a possible dry spell could easily change this bounty. DCR encourages ongoing conservation measures to ensure adequate water supplies all year. 💧



downstream

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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 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.

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