

What is a watershed?

An area of land where water drains to the lowest point and collects is called a **watershed** – and you're standing in one right now!

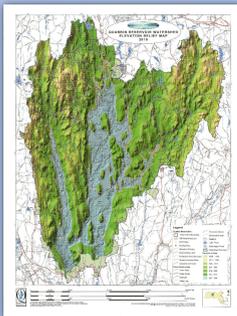
The boundaries of a watershed are typically defined by ridges, or areas of higher elevation, that surround a natural basin. Water flows to the lowest point and soaks into the ground, where it replenishes aquifers – layers of permeable rock and soil beneath the earth's surface that act like a sponge, absorbing, storing, and slowly releasing groundwater. Rainfall and snowmelt accumulate and drain into streams and rivers. These smaller bodies of water flow into larger ones, like lakes, reservoirs, and oceans. Precipitation that falls anywhere in the watershed of a given stream, river, pond, or reservoir will eventually end up in that body of water. Imagine an upside-down umbrella in the rain. Raindrops roll down the inside walls and collect at the bottom - this is how water collects in a watershed.



Watersheds sustain all life on Earth. They regulate air quality, temperature, and precipitation; provide erosion and flood control; filter pollutants from water that replenishes aquifers; support wildlife habitats; provide recreation and tourism opportunities; and have far-reaching impacts on human health and economic capital. Some watersheds supply drinking water to millions of people.

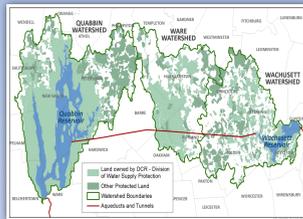
Watershed protection is a means of protecting a body of water by managing the surrounding land that drains into it. Everything is connected in a watershed –every potential impact, positive or negative, is washed downhill into our drinking water. Protecting the health of our watersheds is key to conserving this critical natural resource for future generations – and everyone has an important role to play.

Quabbin Reservoir Watershed



The Department of Conservation and Recreation - Division of Water Supply Protection (DWSP) is responsible for managing the health of the watershed to assure the availability of pure water for future generations. Quabbin Reservoir is a forest-filtered water supply – the forest that surrounds the reservoir filters sediment and contaminants from runoff, preventing these pollutants from affecting water quality. 3.1 million Massachusetts residents – over 43% of the state's population - rely on Quabbin's resilient watershed forest biofilter to provide high quality source water that does not require further expensive mechanical filtration.

The Quabbin Reservoir watershed covers 120,000 acres, including the surface area of the reservoir. Precipitation that falls in the surrounding towns of Athol, Barre, Belchertown, Hardwick, New Salem, Orange, Pelham, Petersham, Phillipston, Shutesbury, Ware, and Wendell drains into the reservoir, carrying pollutants that can impact the quality of the water.



Maintaining the health of the watershed is a delicate balance. The Watershed Protection Act (313 CMR 11.00) regulates land use and activities within critical areas of the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds for the purpose of protecting the source supply of drinking water. Working together to manage the land surrounding the reservoir is critically important as strict water quality guidelines must be met.

Pollution control

The health of a water supply is heavily influenced by the condition of the surrounding watershed, as pollutants can be washed from the land into the water, where they can cause substantial harm. Watershed protection is the best pollution control. DWSP staff identify activities or conditions that could potentially degrade water quality and develop strategies to control these threats.

Potential sources of pollution in the Quabbin Reservoir watershed include:



bacterial contamination from bird and mammal feces



increased erosion and introduction of invasive species by public access



contaminated runoff from agricultural or residential areas

Careful management of pollution sources allows DWSP to meet many water quality goals for the system, including the prevention of waterborne disease, maintenance of high-quality source water, and strict criteria for bacteria levels, nutrients, and sediment.

The Environmental Protection Agency introduced the Surface Water Treatment Rule (SWTR) in 1989 to ensure that public water supply systems provide safeguards against the contamination of water by viruses and bacteria. These regulations require filtration by every surface water supplier unless strict source water quality criteria and watershed protection goals are met, including the development and implementation of a detailed watershed protection plan. The Department of Water Supply Protection and the Massachusetts Water Resources Authority work together to manage watershed lands to meet the strict requirements of the waiver. The DWSP and the MWRA have successfully maintained the health of the watershed and met water quality goals necessary to maintain a joint waiver for the filtration requirement of the SWTR since 1998.

Preparing for the future

The watershed protection planning process has been ongoing since DCR's first Watershed Protection Plans were completed in 1991. Priorities for watershed control programs change as water quality threats are contained and new issues emerge. Watershed protection seeks to implement best practices to restore ecosystems, filter pollution from runoff, and increase climate resiliency.

Climate projections for Massachusetts predict rising air and water temperatures and changes in the timing, intensity, and duration of precipitation, with lengthy dry periods and infrequent but very heavy episodes of rainfall. This will result in direct and indirect impacts from climate change, as well as short-term and long-term effects on the quality and quantity of water available in the DWSP's watersheds, including:

- Higher water temperatures reduce dissolved oxygen levels in water, adversely impacting aquatic life.
- Increased frequency and intensity of rainfall may cause flooding, erosion, and sedimentation problems, with changes in stormwater runoff carrying a variety of pollutants into streams and wetlands.
- The combination of decreased oxygen, increased stormwater runoff, and increased temperatures can result in harmful algal blooms across DWSP watersheds.
- Changing patterns and quantities of precipitation can lead to drought, less dilution of pollutants, impacts to aquatic organisms, and changes to the timing and amounts of water storage in the reservoir.
- Variations in temperature and precipitation also can lead to new stresses on existing ecosystems and changes in plant and animal populations, altering forest composition and creating opportunities for new invasive species arriving or problematic resident species becoming more dominant.

It is critical that we act now to help watersheds prepare for and adapt to climate change. The Watershed Protection Plan continues DCR's successful efforts of managing the source of an unfiltered water supply. This plan update provides a structured methodology to assess changes in watershed threats, develops programs to address the threats, and prioritizes staff assignments so they are congruent with current watershed management issues. The plan concludes with a five-year implementation strategy that summarizes objectives for the Division of Water Supply Protection to achieve from Fiscal Years 2024 to 2028.

Scan the QR code to view the Watershed Protection Plan, updated June 2023:



Watershed Protection

Watersheds sustain all life on Earth – protecting them is critically important to improving climate resiliency and ensuring safe, clean water for future generations. Watershed protection is a means of protecting a body of water by managing the surrounding land that drains into it.

Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Quabbin/Ware Region
485 Ware Road Belchertown, MA 01007
413-323-7221 www.mass.gov/dcr/watershed

Land acquisition

Active land acquisition permanently protects watershed land from development and allows DWSP to maintain ideal water quality protection landscapes by restoring and maintaining a stable vegetative cover. Since 1985, DWSP has acquired over 27,820 acres of land. Approximately 77% of the Quabbin Reservoir watershed is protected land; 62% is managed by DWSP. Other state agencies, non-governmental organizations, and watershed communities manage the remaining protected land.



The purchase or control of additional forested, relatively undisturbed properties provides permanent protection to watershed lands, proactively reduces threats to water quality that would result from additional development, helps mitigate the growing impacts of climate change, and increases the adaptive capacity of DWSP's existing holdings.

Land acquisition benefits the source water supply system by preventing water quality degradation from threats such as bacteria, pathogens, excess nutrients, sediments, heavy metals, and other pollutants. Trees and forests serve as an active living biofilter, capturing and slowing storm water and filtering sediment and pollutants that would otherwise end up in our water supply.



Acquired land joins DWSP's vast network of sustainably managed, structurally and compositionally diverse forests. Increasing forest cover on these lands makes the watershed more resilient to the impacts of climate change, such as severe weather events, temperature and precipitation changes, outbreaks of disease, and invasive plant and pest infestations.

Protected lands remain privately owned and managed but are subject to restrictions that prevent the land from being developed and converted for other land uses. Permanently protecting these forested landscapes helps to sequester carbon and prevent carbon emissions.

Climate resilient forest

DWSP's Watershed Forestry program is developing a climate resilient forest that effectively sequesters carbon and is a key component to the Commonwealth's climate change mitigation strategy. The primary goal of the watershed protection program is to promote healthy forest cover on lands owned and managed by the DWSP. DWSP's vast network of lands are sustainably managed as structurally and compositionally diverse forests making these lands more resilient to impacts of climate change, such as severe weather events, temperature and precipitation changes, outbreaks of disease, and invasive plant and pest infestations. Through the application of sound and sustainable watershed forest management techniques, DWSP-owned forested lands are deliberately managed to promote age, size, and species diversity – all key features that make up a climate-resilient forest.

Managing for a structurally and compositionally diverse forest



Young forests with new growth are often more diverse and resilient than mature forests and are less susceptible to damaging wind events. Cultivating and maintaining a rotating mosaic of young forest diversifies wildlife habitat while establishing the next stage of forest growth.



Mature trees are intentionally managed to promote species diversity and improve long-term resiliency of the forest. Careful selection and removal of dead or dying trees allows sunlight to reach the forest floor where new growth takes hold. DWSP only regenerates about 1% of its forests each year.



Trees in their prime grow and accumulate biomass faster than their more mature counterparts, pulling carbon dioxide from the atmosphere and sequestering, or storing, it in wood. Carbon sequestration plays an important part in reducing the effects of climate change.



DWSP has set aside thousands of acres of reserve forest where old growth conditions are redeveloping after centuries of human land use. These areas are not actively managed and are allowed to develop and grow naturally, free from human disturbance.

DWSP forests sequester and store a tremendous amount of carbon. Long-term monitoring data collected from Continuous Forest Inventory (CFI) plots demonstrate that DWSP's forests are healthy and maturing.

Wildlife management

DWSP works to protect important wildlife and their habitats while minimizing or eliminating adverse wildlife impacts on other watershed resources. Mitigating the negative impacts of roosting and migratory birds on the water supply is a critical component of watershed protection. Active management of deer population is also conducted as part of the watershed protection plan.



Bird Harassment Program

The active harassment phase usually takes place between mid-October and mid-April, with a break in the winter if ice prevents birds from roosting. Although some birds are present at the reservoir all day, most leave the roost shortly after sunrise, spend the day feeding elsewhere, and return to the reservoir to spend the night. During the active harassment phase, Quabbin maintains a "Bird Free Zone" patrolled by shore and boat crews, utilizing pyrotechnics and herding techniques to move the gulls and other waterfowl outside of the sensitive water supply protection area. Documentation of bird numbers and movement is important, and weekly counts of roosting birds are done just before dark by DWSP staff.



Controlled Deer Hunt
Overabundant white-tailed deer populations pose a significant threat to forest regeneration. When deer populations are protected for many years and sustained at high densities, forest structure may be altered completely due to overgrazing, resulting in park-like stands with grass or ferns dominating the understorey. The goal of Watershed Deer management Programs is to reduce and maintain the deer population at levels that allow for diverse tree species regeneration and forest understorey structure resulting in the development of a healthy, resilient, and diverse forest that can adequately and continuously protect water quality. This is accomplished by an annual controlled deer hunt to maintain population levels.



Canada Goose Population Control

Canada geese can expel Giardia cysts into the environment and carry other harmful bacteria like Cryptosporidium spp. The Watershed Canada Goose Population Control Program includes locating active nesting areas in selected areas of the Reservoir's shoreline, particularly on islands. After nests are discovered, the eggs are marked and treated to prevent hatching. Barrier fencing is constructed, coyote decoys deployed, and active harassment implemented to discourage geese access onto lawns and Reservoirs.

Public access

Public access is the human presence and activities on DWSP owned lands and waters. The potential threat to water quality from public access and recreation comes both from allowed (e.g., hiking) and prohibited (e.g., swimming, dumping) activities. Presently the most popular land-based activities at Quabbin include driving for sight-seeing, walking and bicycling (on designated routes), and bird watching. Water-based activities are boat fishing through one of the three Boat Launch Areas and shore fishing from several locations around the reservoir. Unauthorized activities on both DWSP lands and waters are considered a potential threat to water quality.



Human activity on or near water supply source waters can introduce disease-causing agents to the water supply and cause increases in nutrients, sediment, and invasive species. Federal and state drinking water regulations require that public access on drinking water supply lands must be managed to minimize the risk of waterborne disease and to control other impacts such as erosion and sedimentation.



The Public Access Management program guides and controls public access and use of DWSP lands to protect water quality, safety, and security. The reservoirs and associated lands are valuable environmental resources of the Commonwealth that are open space attractions to watershed residents and the public alike. Public access has historically been allowed on portions of DWSP's water supply lands, and DWSP believes that controlled public access can continue to be allowed without creating significant risk to the watershed system.

Through the continued efforts of the DWSP to monitor and manage the watershed, and the cooperation of local organizations and the public, we can continue to protect the health of our watersheds and the quality of our water supply for future generations.

Sources:
National Oceanic and Atmospheric Administration - "What is a watershed?" (noaa.gov)
Department of Conservation and Recreation - "DCR Watershed Protection Plan FY24-FY28" (mass.gov)
U.S. Environmental Protection Agency - "Healthy Watersheds Protection" (epa.gov)
EDEF - "2022 Massachusetts Climate Change Assessment" (mass.gov)
DCR Office of Watershed Management - "DCR Watershed Forestry, Climate Resiliency, and Carbon" (mass.gov)
Photos: DCR Archives and mass.gov