



PROTECT YOUR DRINKING WATER

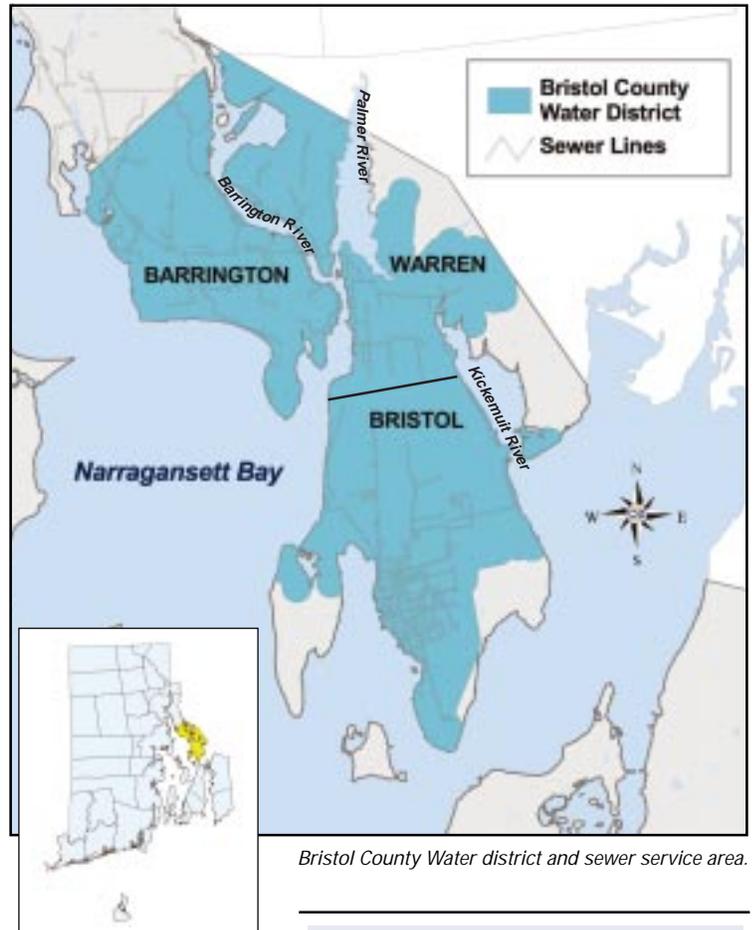
Safe and healthy lives in safe and healthy communities

Bristol County Drinking Water Assessment Results

The Bristol County Water Authority (BCWA) supplies drinking water to residents and businesses in Barrington, Bristol and developed portions of Warren, Rhode Island – a total population of about 55,000 people. Locally, Bristol County Water relies on a system of two separate surface water supply watersheds and one wellfield. Since completing the East Bay Pipeline in 1998, BCWA also maintains a connection to Providence Water's Scituate Reservoir.

The BCWA water supplies are located in both Rhode Island and Massachusetts. There are three sources:

- The Shad Factory Pond and Anawan Reservoir are the primary supplies. The combined watershed – the land that drains to the supplies – is located entirely in Massachusetts, largely in the town of Rehoboth.
- The Kickemuit and Swansea Reservoirs are smaller back-up supplies, with a watershed covering about 3,300 acres, primarily in Swansea MA. The Kickemuit Reservoir itself is located in Warren, RI.
- The Barrington well head protection area is a 480 acre zone where infiltrating rainwater recharges groundwater surrounding the wells located near Brickyard Pond in Barrington, RI.



Bristol County Water district and sewer service area.

Findings

The Bristol County Water Authority maintains an active watershed management program that includes watershed monitoring and acquisition of land or conservation easements.

- Forested headwaters in the surface water supply watersheds help maintain water quality but substandard septic systems, runoff from paved areas, and agricultural activities located in shoreline areas are major threats to reservoirs. Public wells in Barrington are at risk from underground storage tanks and commercial activities that may use hazardous materials.
- All water supplies are meeting drinking water standards, but the Kickemuit Reservoir and its tributaries are impaired due to high levels of bacteria and nutrients with related growth of algae. State agencies are working with watershed communities to identify pollution sources and develop protection plans.
- With 95 percent of the watershed land surrounding the BCWA water supplies located in Massachusetts, a regional approach is needed to restore water quality. Steps taken to protect or restore drinking water quality will also enhance sensitive aquatic habitat within source water areas and in downstream coastal waters.

Source Water

The focus of this assessment is on public drinking water supply “source” areas – the wellhead protection area that recharges a well or the watershed that drains to a surface water reservoir. Source water is untreated water from streams, lakes, reservoirs, or underground aquifers that is used to supply drinking water.

This fact sheet summarizes results of a source water assessment conducted for the Bristol County Water Authority. It identifies known and potential sources of pollution in drinking water supplies and ranks their susceptibility to future contamination. The goal of this study is to help water suppliers, local officials and residents living in drinking water supply areas to take steps to keep water supplies safe.

Land Use & Threats to Water Quality

Within a watershed, or groundwater recharge area, the quality of groundwater and surface water is directly related to land use activities. To locate high-risk threats most likely to affect water quality, the two reservoir watersheds and the wellhead protection area were evaluated and ranked based on landscape features including: high intensity land uses, protected shoreline buffers, and estimated nutrient sources such as septic systems and fertilizers. A rating from low to high was assigned to each factor and summed to create an average pollution risk score for each assessment area, and an average susceptibility rank for the whole water supply.

Susceptibility to Contamination



The results show that the Bristol County Water supplies are moderately susceptible to contamination. This is an average ranking for the entire system based on land use and existing water quality. Individual sub-watersheds may be more or less susceptible to contamination.

Note: A moderate ranking means that the water could become contaminated one day. Some contaminants can affect taste, odor and cost of water treatment at levels below safe drinking water standards. Protection efforts are important to assure continued water quality.

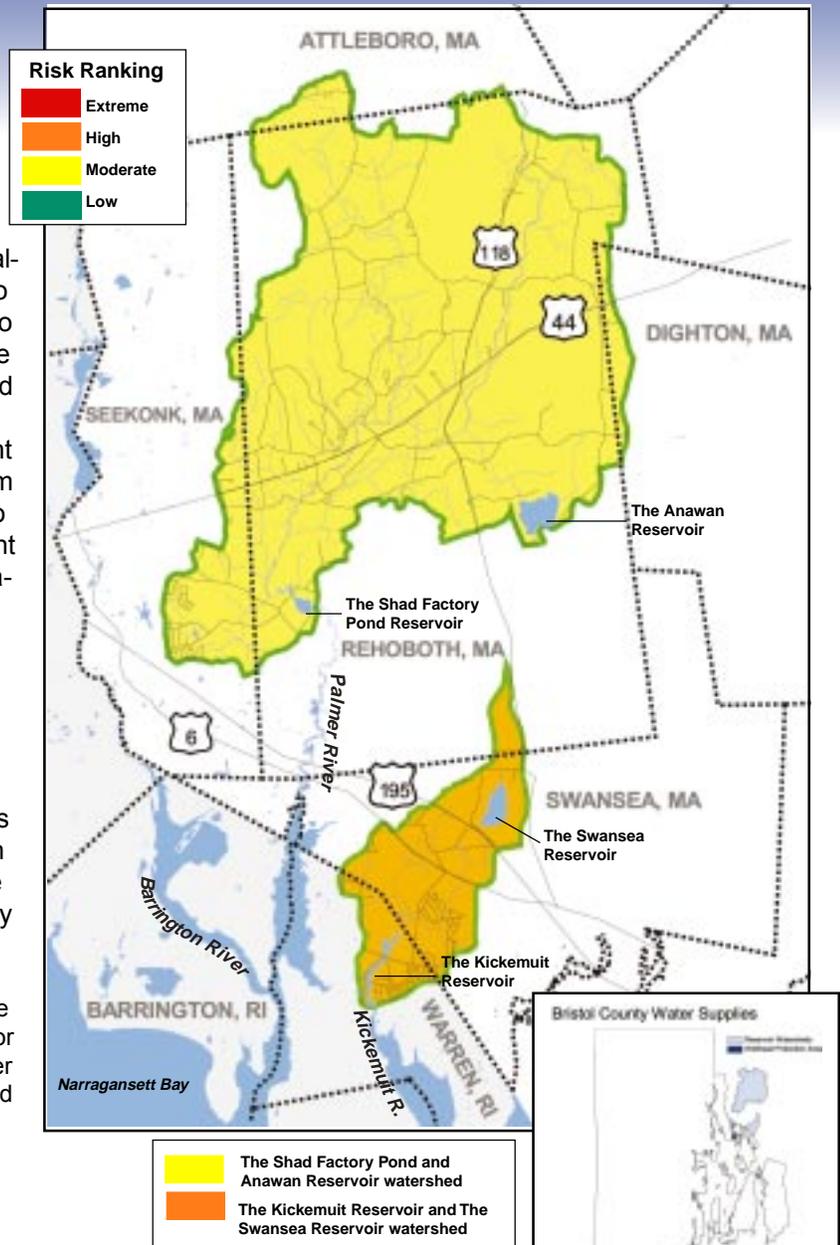
Surface Reservoir Watersheds

Shad Factory Pond and Anawan Reservoir Watershed

Shad Factory Pond, an impoundment of the Palmer River, is the primary water supply. The upstream Anawan Reservoir is a back-up reservoir which flows into Shad Factory Pond via the Palmer River. Both the pond and the river have been designated as an important cold-water fishery, which is highly sensitive to sediment, nutrients and changes in flow related to stormwater runoff.

The Shad Factory Pond / Anawan Reservoir watershed is relatively undeveloped with 65 percent protective forest and wetland and a mix of agriculture and residential development. A small number of pollution sources are located in critical shoreline areas, increasing risk of contamination locally. Water withdrawals and resulting low flow may also be affecting the fishery, particularly during periods of drought.

The MA Department of Environmental Protection (DEP) is currently developing a pollution prevention plan for the watershed, which should identify pollution sources and protection measures.



The streamside zone is a critical water quality protective zone. Although forest cover is ideal, natural grass buffers can be good filters when unfertilized and undisturbed. Runoff and agriculture activate. Photo courtesy Kickemuit River Council.

The Kickemuit Reservoir and Swansea Reservoir Watershed

Water from the upper Swansea Reservoir is released when needed and flows south to the Kickemuit Reservoir in Warren, RI. Eighty percent of this watershed is located in Massachusetts.

- The Kickemuit Reservoir is impaired due to high bacteria and nutrients that trigger excessive growth of algae. Sediment and aquatic plant matter is affecting drinking water taste and odor and can also reduce reservoir capacity and increase water treatment costs. The Kickemuit and Palmer rivers are also impaired due to poor aquatic habitat and high bacteria or nutrients.
- Failing septic systems in Swansea, MA have been identified as a source of bacteria to the river. Downstream in Rhode Island, fertilizers and sediment from tilled cropland are potential pollution sources but actual impacts are highly variable and can be minimized with good farming practices.
- Pollution risks are concentrated in shoreline areas where high intensity urban and farm uses occupy 15-20 percent of the buffers to surface waters and tributaries. The estimated percent of impervious cover is 14 percent, just above the 10 percent level considered safe for stream quality. Any increase in impervious levels with future development is a concern given current borderline impervious levels and existing water quality impairment.
- Sewers in the RI portion of the Kickemuit River and the Barrington wellhead protection area help to reduce risk of wastewater contamination, provided sewer lines and pump stations are checked for leaks. In low density areas septic systems help recharge groundwater, but outdated systems in shoreline areas present the greatest risk that nutrients and bacteria will reach surface waters, especially in high water table sites.



The Kickemuit River estuary downstream of the Reservoir Dam. Reducing bacteria and nutrients in the watershed will help protect downstream shellfishing habitat. Photo courtesy Kickemuit River Council.



The Kickemuit Reservoir. Photo courtesy Kickemuit River Council.

The Barrington Wellhead Protection Area

The groundwater recharge area for the Bristol County Water Authority wells is a mix of commercial and high density residential development. Located in downtown Barrington, there are a number of old landfills, underground storage tanks and businesses where hazardous materials may be used. These present an extreme risk of contamination, especially since most are located on sandy soils where pollutants can move readily into groundwater.

The adjacent Brickyard Pond is an important scenic and recreational resource for Barrington residents, which supports a sea-run fishery. Although much of the land around the pond has been protected, the pond is not meeting RIDEM standards due to high nutrient inputs, resulting in excessive growth of algae and poor water clarity. Polluted runoff and residential fertilizers are potential sources of contamination.

A review of sampling data shows that all drinking water standards are being met and water is free of contaminants. However, high sodium levels in one well suggest salt water intrusion may occur with overpumping.



The Barrington wellhead protection area



Brickyard Pond, Barrington. Photo courtesy URI Watershed Watch.

What You Can Do to Protect Water Quality

Municipal Boards and Government

Warren has adopted the Kickemuit Reservoir Watershed Overlay District to control land development impacts and Barrington is considering adoption of an aquifer protection district for its groundwater supplies.

Based on the results of the current RI and MA water quality "TMDL" investigations and this assessment, evaluate gaps in current ordinances, and incorporate key recommendations into town plans and ordinances. Work with the MA state agencies and watershed towns to implement a regional water supply protection strategy. Develop regional open space plans to prioritize land protection immediately adjacent to water supplies and tributaries. Coordinate drinking water protection with Phase 2 Stormwater Plans.

Establish community pollution prevention education programs. Start by mailing this fact sheet to watershed residents and water users. Adopt model practices at municipal garages, schools and parks.

Controlling runoff and nutrients

- Use zoning setbacks for maximum protection of small headwater streams and wetlands.
- Set standards for maximum impervious cover at current levels or no more than 10 percent in less developed areas; limit site disturbance and keep runoff volume at pre-development levels; update site design and stormwater runoff controls using state-of-the-art practices.
- Establish standards for redevelopment and infill to limit impervious cover, retrofit storm water systems and restore wetland buffers.
- Use creative development techniques to preserve farmland and open space.
- Apply strict erosion controls. Assign field inspectors in erosive sites.

Managing wastewater/Keeping septic systems functioning

- Inspect and maintain sewers to prevent leakage and infiltration.
- Adopt septic system management programs requiring regular inspection and maintenance without waiting for point-of-sale inspections. Phase out cesspools in critical areas. Restrict new alternative systems on highly marginal land.

Water Supplier

- Implement recommendations of the latest water supply system management plan.
- Continue to acquire land for protection, focusing on intake areas and tributary buffers.
- Work with local officials to implement land use protection measures and education programs.
- Inspect water supply and protection area regularly for potential pollution sources.
- Expand reservoir sampling to monitor nutrient enrichment levels, track frequency and duration of algal blooms.

Homeowners

Maintain wooded buffers or restore natural vegetation along wetlands or watercourses that run through your property. Reduce fertilizer and pesticide use. Limit watering.

All septic systems need regular care to function properly, keep your well safe, and avoid costly repairs. Inspect annually and pump tank when $\frac{1}{2}$ full, usually every 3-7 years. If you have a cesspool plan to replace it. Replace underground fuel tanks with above ground tanks. For information about protecting your well contact URI Home*A*Syst (401) 874-5398, www.uri.edu/ce/wq

Farmers and Landowners

Work with the USDA Natural Resource Conservation Service to develop a conservation plan that addresses proper nutrient, manure, pest, and irrigation water management. Protect and restore buffers to shorelines and wetlands. Contact them at (401) 828-1300, www.nrcs.usda.gov

Commercial and Industrial Businesses

Adhere to all laws, regulations, and recommended practices for hazardous waste management, above and underground storage tanks, and wastewater discharges. Check local regulations with city/town hall and state regulations with the RI DEM Office of Water Resources (401) 222-4700, www.state.ri.us/DEM/program/benviron/water/index.htm

This assessment was conducted by the University of Rhode Island Cooperative Extension with funding from the R.I. Department of Health, Source Water Assessment Program, established under the 1996 amendments to the Federal Safe Drinking Water Act.

Cooperative Extension in Rhode Island provides equal opportunities in programs and employment without regard to race, color, national origin, sex, or preference, creed or disability. URI, USDA, and local governments cooperating. This is contribution # 3986 of the URI College of the Environment and Life Sciences.

For More Information

- **R.I. Department of Health, Office of Drinking Water Quality**, (401) 222-6867, www.HEALTH.ri.gov/environment/dwq/Home.htm
- **URI Cooperative Extension Nonpoint Education for Municipal Officials (NEMO)** (401) 874-2138, www.uri.edu/ce/wq
- **Bristol County Water Authority** (401) 254-5547, www.bcwa-ri.com

Report prepared by URI Cooperative Extension, NEMO program.
Editing and graphic design by Rhode Island Sea Grant (2003).



UNIVERSITY OF
RHODE ISLAND

