

## 14. WATER RESOURCES

### The Penobscot River

**Overview.** The Penobscot River is Brewer's primary water resource. It forms the western boundary of the City, providing a link between the City and the sea. The Penobscot River watershed is new England's second largest watershed, draining an area of 8,570 square miles including about a quarter of the State of Maine. It includes most of Maine's pristine bogs and ponds as well as Baxter State Park near its center. A system of upstream dams, the relatively gradual fall of the river, averaging only three feet per mile, and the presence of extensive wetlands in the eastern part of the basin has in the past served to minimize flooding in Brewer. River and estuary meet in Brewer where tidal fluctuations are about 6.5 feet.

**Watersheds.** All of Brewer's surface waters flow into the Penobscot River, either directly or through its tributaries including Eaton Brook, Felts Brook, and Sedgeunkedunk Stream. The four major watersheds of the City are the Penobscot Watershed (draining most of the urbanized area closest to the Penobscot), Felts Brook Watershed (draining most of the central, rural area portion of the community including Wilson Street), Eaton Brook Watershed (draining the northern quarter of the community) and Sedgeunkedunk Watershed (draining a small area in the southwestern part of Brewer).

**Water quality.** The Penobscot River is a Class "B" water from the confluence of the Mattawamkeag River downstream to Brewer and south to Penobscot Bay. Eaton Brook, Felts Brook, and Sedgeunkedunk Stream are also Class B waters. According to state law, Title 38 M.R.S.A. Section 465, Class B waters are the third highest classification of water bodies. Class B waters must be of such quality that they are suitable for drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process cooling water, hydroelectric power generation, navigation, and as habitat for fish and aquatic life.

The Maine Department of Environmental Protection (DEP) monitors Penobscot River water quality on a periodic basis. One major focus of recent efforts has been to measure the effectiveness of DEP's to improve low dissolved oxygen (DO) levels caused by excessive phosphorus. According to the report "Penobscot River Phosphorus Waste Load Allocation Ambient Monitoring Plan Report – 2012," published in May of 2013, in terms of dissolved oxygen levels, the upper portion of the river (above the Old Town area) appears to be in good condition. However, the lower portion of the river is still experiencing significant day/night DO swings which should improve following dam removal efforts. Based on a discussion with the author of the report, Robert Mohlar, Professional Engineer, the overall quality of the Penobscot River (in terms of dissolved oxygen) has improved markedly in recent decades.

Brewer has made significant contributions to the improved quality of the Penobscot River through improvements at its wastewater treatment plant, by its investment in separating its storm and sanitary sewers, and by its ongoing efforts to involve citizens in keeping its tributaries and adjacent shorelands clear of trash and debris (see Sanitary Sewer System inventory).

**Penobscot River Restoration Project.** One of the most significant changes to affect the Penobscot River in many decades is the implementation of the Penobscot Restoration Project. The following paragraphs are adapted, with permission from the Penobscot River Restoration Trust website (<http://penobscotriver.org>).

“The Penobscot River Restoration Project is one of the largest, most creative river restoration projects in our nation's history. In an unprecedented collaboration, the Penobscot Indian Nation, seven conservation groups, hydropower companies PPL [Pennsylvania Power and Light] Corporation and Black Bear Hydro, LLC, and state and federal agencies, are working together to restore 11 species of sea-run fish to the Penobscot River, while maintaining energy production. Successful implementation of the project will revive not only native fisheries but social, cultural and economic traditions of New England's second largest river- the Penobscot.”

“The Penobscot River Restoration Trust is the non-profit responsible for implementing the restoration effort, including purchase of the Veazie, Great Works, and Howland dams in 2010. The Penobscot Trust removed the Great Works Dam in 2012, and the Veazie Dam in 2013. The Trust plans to decommission and build a bypass around the Howland Dam. Combined with additional fish passage enhancements at four other dams owned by Black Bear Hydro, the project will significantly improve access to nearly 1,000 miles of habitat for sea-run fish. Energy enhancements at Black Bear Hydro facilities means energy production will remain at least the same as when the Project began, and likely increase. The Penobscot Trust board includes representatives from the Penobscot Indian Nation, American Rivers, Atlantic Salmon Federation, Maine Audubon, Natural Resources Council of Maine, Trout Unlimited, and The Nature Conservancy, along with three additional directors.”

## **Water Supply – Hatcase Pond**

(See Water Supply inventory)

## **Groundwater Resources**

Groundwater is water that is derived from precipitation that infiltrates the soil, percolates downward, and fill the tiny, numerous spaces in the soil and cracks or fractures in the bedrock below the water table. Wells draw water from permeable layers or zones in the saturated soil and fractured bedrock. In general, the saturated areas that will provide adequate quantities of water for use are called aquifers. Two major types of aquifers occur in Maine – sand and gravel aquifers and bedrock aquifers. Wells in sand and gravel aquifers yield from 10 gallons per minutes (gpm) up to 2,000 gpm, while wells in fractured bedrock generally yield from 2 to 25 gpm.

Maps of significant sand and gravel aquifers have been published by the Maine Geological Survey. According to this information, there are two sand and gravel aquifers in Brewer. One aquifer extends for 1.75 miles along the bank of the Penobscot River, from North Brewer southward. The second aquifer underlies much of the former Eastern Fine Paper mill site. Since Brewer is served by a municipal water system, it is unlikely that either of these aquifers will be needed to augment the municipal water supply or support private wells.

Bedrock aquifers are more difficult to identify and quantify, and their extent and occurrence in Brewer have not been studied.

## **Floodplains**

A floodplain is the flat expanse of land along a river or shoreline that is covered by water during a flood. Under the federal Flood Insurance Program, the 100-year flood (which has a 1% chance of occurring during any single year) is called the flood hazard area. During a flood, water depths in the floodplain may range from less than a foot in some areas, to over 10 feet in others. Floodplains along rivers and streams usually consist of a floodway, where water flows, and a flood fringe, where stationary water backs up. The floodway will usually include the channel of a river or stream as well as some of the land area adjacent to its banks. Flooding often occurs in the spring months, from rapid runoff caused by heavy rains combined with snowmelt. Flooding can also occur at other times of the year, and can be complicated by tides. Hurricanes and tropical depressions can also result in flooding.

The main floodplains in Brewer are found along the Penobscot River, Eaton Brook and upper Felts Brook. They are not extensive and do not serve as agricultural lands. The most extensive areas subject to flooding are on the Penobscot River between Eaton and Felts Brooks, and at the east end of Wilson Street on Felts Brook. However, because of the steep banks of the Penobscot River, flooding is not a major problem. Removal of the Great Works Dam in 2012, and the Veazie Dam in 2013 may have an impact on flooding in Brewer, but the nature of the impact is unknown.

The City of Brewer regulates development in floodplains identified by the Federal Emergency Management Agency. Regulations are set forth in Article 8, Floodplain Management, of the Land Use Code of the City of Brewer. Property owners within the flood hazard area qualify for federally subsidized flood insurance, and are subject to the requirements of Brewer's ordinance. FEMA's floodplain maps are now out-of-date, especially in light of the removal of the Great Works and Veazie dams.

## **Lakes**

There are no lakes in Brewer. Fields Pond is the only lake in the greater Brewer area with its watershed partly within City limits. Only 7.8% of its drainage is within Brewer and that part, in the southeast corner of the City, is undeveloped and swampy. This part of the pond's watershed does not appear to be at risk from development that might threaten the water quality of the pond.

## **Analysis**

### **1. Are there point sources (direct discharges) of pollution in the community? If so, is the community taking steps to eliminate them?**

The City of Brewer has addressed direct discharges of pollution. As documented in the sanitary sewer inventory, Brewer is served by a Water Pollution Control Facility that is now a leader in pollution control technology. In 2012, the City completed 20 years of storm/sanitary sewer separation work. The City has an active program aimed at detecting and eliminating illicit discharges and non-storm water discharges to the City's storm water collection system.

### **2. Are there non-point sources of pollution? If so, is the community taking steps to eliminate them?**

The City has addressed non-point sources of pollution. Brewer has enlisted the help of volunteers in its annual spring cleanup along streams and brooks. Each year, these volunteers collect 4-6 tons of debris from the City's stream corridors. In addition, the City's Site plan and Subdivision ordinances require that all development meet Low Impact Development requirements for managing storm water on-site.

**3. How are groundwater and surface water supplies and their recharge areas protected?**

As documented in the water supply inventory, Brewer receives its water from Hatcase Pond, located in Dedham and Eddington. The City's Water Department owns over 300 acres of the 1,707 acres in the watershed, and has acquired conservation easements on an additional 1,091 acres. The Department also closely monitors land use activities in the watershed with the goal of maintaining high water quality for current and future customers. Brewer does not utilize ground water for its municipal water system, and has therefore not actively protected the two small sand and gravel aquifer areas along the Penobscot.

**4. Do public works crews and contractors use best management practices to protect water resources in their daily operations (e.g. salt/sand pile maintenance, culvert replacement street sweeping, public works garage operations)?**

The Public Works Department utilizes best management practices in its daily operations. There is a Spill Prevention Control and Countermeasures (SPCC) Plan in place for the entire public works garage operations including a SPCC for the gas pump area. A new sand/salt storage building was constructed in 2005. Public Works uses erosion and sedimentation control measures as required on all project sites. Every street is swept every spring and all 1600+- catch basins are cleaned yearly. Ditching and culvert replacements are performed as needed. Public works would benefit by the addition of a tailgate mulcher. Crews currently hand-mulch all exposed areas by hand.

**5. Are there opportunities to partner with local or regional advocacy groups that promote water resource protection?**

The City of Brewer has partnered with local citizen volunteers in its annual cleanup of stream corridors, which has now expanded to City-wide locations. In addition, the Water Department has worked closely with landowners to help protect the quality of Hatcase Pond. The City also participates with the Brewer Land Trust, the Bangor Area Stormwater Group, and the Lower Penobscot Watershed Coalition for education resources.