Castine Drinking Water Sources (Part 2)

By George Motycka, Castine Utility Superintendent

Geologically speaking, Castine Neck is an island. This geologic isolation limits the available drinking water supply to precipitation that falls and is stored directly on the Neck. On the mainland, streams, rivers and lakes are interconnected both above ground and also underground in extensive aquifer networks. On Castine Neck, in contrast, all drinking water comes from local precipitation.

Precipitation that collects on the ground and is stored in ponds or reservoirs is classified as surface water, and has the possibility of containing bacteria that are potentially harmful to humans. Revised national health standards of the 1980's mandated that these bacteria be removed from drinking waters. Castine's water source for over 100 years had been surface water and this ruling caused a major departure in the way we harvested water. Treating surface water to remove contaminants is a complicated and costly process. Since the onset of the surface water treatment regulations, small water systems, like Castine's, have been abandoning their surface water sources in favor of ground water supplies.

When precipitation is absorbed into the ground it becomes classified as ground water. This water is cleaned as it flows through the soils and collected in underground aquifers isolated from harmful bacteria. Ground water pumped from wells is the preferred water source for a small system. Castine has followed this conventional logic with the development in the 1990's of the Wadsworth and British Canal wells as their primary water source.

The bedrock foundation of the Castine Neck protrudes over 200 ft. above sea level and forms a ridge across the middle of the island. Over time, various geological forces caused significant cracking throughout the middle of this bedrock ridge. Overlying the bedrock along this ridge is a deposit of sand and gravel left by deglaciation and wave action thousands of years ago. The sandy soil readily accepts rain water and allows good ground water flow to the fractured bedrock below the ridge. These fractures create a pathway for water to percolate down into the voids in the bedrock and supply water to this deep aquifer beneath the Neck. The deep aquifer is the Neck's only significant underground water reserve producing about 20 million gallons of water annually for the town. Recharge for this aquifer is limited to local precipitation that falls on the ridge's sandy soil and percolates down through to the cracks in the rock. This aquifer is isolated from larger mainland aquifers, it does not benefit from rainfall over the rest of Maine, only rain that falls on the ridge area of the Castine Neck feeds this deep aquifer.

This deep aquifer is also threatened on all sides by the sea. Salt water intrusion is a constant consideration when pumping drinking water out of the deep aquifer. Pressure equilibrium between the deep aquifer and the Penobscot Bay and Bagaduce River must always be maintained. Over-pumping would invite sea water contamination into the aquifer.

The sand and gravel deposit that covers the Neck's ridge extends through the Spring Street well field. Water that does not percolated into the deep aquifer is conveyed by this sandy deposit to the Bagaduce River. The Spring Street wells intercept some of this escaping water. The sand and gravel deposit at this location is 10 to 20 ft. deep by about 200 ft. wide and lies on top of a clay foundation. This shallow aquifer does not have good storage capacity, it is completely dependent on regular precipitation to supply water recharge. The yield from this shallow aquifer is reliable only during periods of high ground water levels producing about 6 million gallons annually.

Presently, we do not have enough approved source water to supply Castine's water needs. Ground water production is at the maximum. Depending on recharge by precipitation we are pumping all that the aquifer will yield. As we move forward, surface water, collected at the Battle Avenue ponds, will have to become an active water source once again. Efforts to find a cost effective way to utilize this surface water source while maintaining a safe and reliable drinking water system are our highest priority. Thank you for your support of these efforts.