www.nhwaterwell.com

Information: New Hampshire Water Well Association

Information in this document is provided in good faith to inform the public about groundwater and water wells. Well owners should ensure that their well contractor has obtained permits (if required) and has referred to local codes, rules, regulations and laws for site selection, construction, maintenance and operation of water wells and water system equipment.

GROUNDWATER AND RIVER FLOW

Where does the water in New Hampshire streams & rivers come from during a drought or when it has not rained recently or when there are freezing temperatures and no snow-melt? Baseflow is the technical name for the dry weather flow in a stream or river. River base flow results from groundwater seeping into riverbanks or the riverbed. The flow may be significant enough to allow the stream to flow year round (i.e., perennial or permanent stream). Without baseflow recharge from groundwater to streams and rivers, many would only have a flow of water for a short period after storm rainfall. Streams that flow only periodically in response to rainstorms or from seasonal snowmelt events are known as ephemeral or intermittent streams. On average, 40 percent of all flow in United States rivers and streams originates as groundwater. Trout streams that flow year round with cool clear water of a nearly constant temperature virtually all result from constant input from groundwater.

A stream with inflow from groundwater is called a “gaining stream” and this is the most common occurrence in New Hampshire. However, there are also “losing streams” that “leak water from their channel into the ground beneath. Losing streams are more common in dry environments where groundwater may flow in a stream only during the “rainy season” of the year. However, excessive pumping from aquifers adjacent to rives can cause then to become “losing streams” with potentially serious consequences for downstream water uses and the aquatic environment. In a gaining stream, the groundwater level is higher than the water level in the channel. In a losing stream, the groundwater is below stream level.

When river levels rise, for example in response to a storm or when there is rapid snowmelt, water can seep from the river into the channel banks as the water level in the channel rises above the pre-storm groundwater level. If the stream overtops its banks to spread over a flood plain, flood water infiltrates to the groundwater under the flood plain. This seepage and infiltration can help reduce the impacts of flooding in downstream areas, and after the storm, the slow release of water from the surrounding saturated area maintains the base flow in the channel. Recharge to aquifers from water infiltrating through the flood plain to the underlying groundwater table is important and is one of the reasons why maintaining flood plains in an undeveloped (pervious) condition is an important consideration for planning development. Tidal rivers may also induce a pattern of losing and gaining conditions from adjacent groundwater as the elevation of the water in the channel rises and falls twice a day with the tide.

A stream may switch back and forth between losing and gaining on a seasonal basis during the year and/or during the course of its flow downstream from its headwaters. Conditions may change from gaining to losing at the upstream end of a meander or at the top of an abrupt change in the gradient of the channel. Pumping a well in the vicinity of a stream or lake may induce a “losing” condition when the zone of drawdown around the well intersects the surface water body. Groundwater and surface water are not separate resources. When our activities use one of these resources, it often affects the other in a relatively short time frame in terms of quantity and quality. The potential impact of groundwater pumping on stream flow is one of the reasons for the state permit requirements for high-yield wells.

Groundwater is also responsible for maintaining moisture and water most of New Hampshire’s wetlands. It is the flow from saturated soil and rock that is important for wetland ecological health. Planning and zoning boards need to understand the relationship and connection of groundwater, wetlands, lakes and rivers when establishing local development policy related to surface water or groundwater use.