

## **HYDROGEOLOGY OF THE SPRUCE HOLE AQUIFER**

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*Descriptors: Aquifer characteristics, groundwater recharge, groundwater movement, groundwater modeling, geophysics, ecosystems, wetlands*

### *Problem and Research Objectives:*

The Spruce Hole Aquifer is a sand deposit bounded by Packers Falls Road, Mill Road and the Oyster River, and is located in the towns of Durham and Lee, NH. It has recently been studied by the USGS and identified as a potential aquifer. This aquifer is strategically located between the Lamprey and Oyster Rivers. The sand deposit is being actively mined and there has been recent development pressure on portions of the formation. In response to the development pressure, the Town of Durham acquired 27 acres of the formation, increasing public ownership of the formation to over 50 acres. This represents roughly 20% of the formation.

The Spruce Hole Bog, located in the central portion of the formation, is the only remaining "kettlehole" bog in southeastern New Hampshire. Its uniqueness has been recognized by the National Park Service, which designated the bog a National Natural Landmark. Bogs are ecosystems whose species composition is potentially greatly influenced by water table characteristics and chemical composition of incoming water. Given the possible use of the Spruce Hole Aquifer as a water source for Durham, and given the possible influence of such development on the hydrologic characteristics of the bog, some baseline information on the biological characteristics of the bog seemed desirable.

The research objectives of this project included: delineation of the lateral and vertical extent of the aquifer through the use of seismic geophysics; completion of monitoring wells and a pumping well; biotic and ecologic assessment of the bog; delineation of the ground water connection to the bog; hydrogeology of the formation; and potential for the formation to serve as a water supply with and without the use of artificial recharge.

### *Principal Findings and Significance:*

A fairly detailed floristic study was submitted the previous January. The plot studies continued. There must have been a significant hydrologic change in the past century to have caused mortality of the large trees in the bog.

The bog is a perched system. It responds rapidly to rainfall; however, the underlying aquifer does not. Water samples will be taken from the bog and deep wells, and environmental isotopes of hydrogen and oxygen will be measured in order to attempt to date the waters.