

6-1-1997

# HYDROGEOLOGY OF THE SPRUCE HOLE AQUIFER

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## Recommended Citation

Ballestero, Thomas P.; Malley, James P.; and Estes, George O., "HYDROGEOLOGY OF THE SPRUCE HOLE AQUIFER" (1997).  
*NH Water Resources Research Center Scholarship*. 97.  
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## **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 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 seems desirable.

The research objectives of this project include: delineation of the lateral and vertical extent of the aquifer through the use of seismic geophysics; completion of monitoring wells and a test 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.

### *Principle Findings and Significance:*

The bog is a perched system. There is a 10-ft unsaturated zone below the bog margin and above the lower aquifer zone. It responds rapidly to rainfall; however, the underlying aquifer does not. Initial data analysis indicated that the production zone is highly transmissive (transmissivity of about 6000 ft<sup>2</sup>/day), and though not intimately connected to rainfall, environmental isotopes imply a relatively recent water source.

The bog was inspected every two weeks during Summer 1993 and cursory examinations were made during Summer 1994 to confirm our findings. Five species were added to the flora in 1994. Fifty plant species representing 21 families inhabit Spruce Hole Bog. The Sphagnaceae and Dicranaceae families were prominent among the mosses (45% and 38% of the moss flora respectively), and 32% of the vascular plant species were members of the Ericaceae, or heath family. One species, the Grass-pink (*Calopogon tuberosus* [L.] BSP) that was present in 1969 was not found during the 1993 or 1994 field seasons.