



# Project Impacts

NSRC-FUNDED RESEARCH FINAL REPORT

## *Rare Fern in Northern Forest Valuable to Understand Plant Responses to Climate Change*



PROJECT AWARD YEAR AND TITLE:

**2011**

*Genetic, Phenotypic, and Habitat Analyses of Dryopteris fragrans, a Rare Fern in the Northern Forests: Implications for Management and Long-Term Survival*

PRINCIPAL INVESTIGATORS:

**Danilo Fernando**

SUNY College of Environmental Science & Forestry  
dfernando@esf.edu

**Donald Leopold**

SUNY College of Environmental Science & Forestry  
djleopold@esf.edu

**Scott Bailey**

USDA Forest Service Northern Research Station, NH  
swbailey@fs.fed.us

Fragrant fern (*Dryopteris fragrans*) is a rare species that grows in crevices of rock cliffs. The Northern Forest of New York, Vermont, New Hampshire, and Maine represents the southern edge of its natural geographic range which could be impacted by a changing climate. NSRC researchers investigated genetic and morphological diversity and habitat characteristics of four fragrant fern populations in each of the Northern Forest states.

Researchers discovered genetic diversity is low within and high among fern populations in the Northern Forest. These populations were genetically distinct from a population in Nunavut, Canada which had the highest level of genetic diversity, followed by a population in New Hampshire. Fern fronds in the northeastern U.S. were larger than those in Nunavut, with the same New Hampshire population displaying the largest fronds. Populations in New York are the most vulnerable due to isolation, small size, and lack of genetic diversity.

In the Northern Forest, fragrant fern occurs only on shaded to partly shaded cliffs. It is found at a broad range of elevations, aspects, and air temperatures and on a variety of rock types. It is always rooted in fractures with a small amount of groundwater seepage, enriched in calcium with low acidity. The fern appears to be more sensitive to moisture and chemical conditions than to temperature, suggesting changes in precipitation are more important to its survival than warming. Fragrant fern is an example of many other species with a southern range limit in the Northern Forest, and serves as a model for understanding elements of biodiversity we could lose to climate change.

