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## Annual Summer Residential Program At UNH Helps Launch Young Scientists

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A sediment core sample containing toxic cyanobacteria collected at York Pond.

DURHAM, N.H. - Zack Messier, who this fall will begin his senior year at the private Tilton School in New Hampshire's Lakes Region, already had the University of New Hampshire in mind for college before he started a four-week summer residential science program at UNH early in July.

But now, as his Project SMART (Science and Mathematics Achievement through Research Training) experience winds down and he and other program participants prepare to present their research results Friday, July 31, 2009, Messier says UNH has "really jumped up on my list" of possibilities. The students present their research posters at 2 p.m. in Morse Hall on the UNH campus.

"This has been a wonderful program because of the one-on-one opportunities we've had to work with professors doing cutting-edge research," says the Manchester native who has focused his research on assessing levels of blue-green algae or "cyanobacteria" that can bloom in lakes and ponds and present

serious health hazards to humans.

Indeed, through the sampling analysis Messier and other SMART students did under the guidance of their faculty advisors, professors James Haney and Barry Rock, Willand Pond in Dover, which had been closed due to cyanobacteria, was reopened to public use.

Notes fellow SMART student Max Post of Oakton, Va., "It was pretty cool to drive by the pond last weekend and see lots of people fishing, swimming, and boating. To have that kind of an impact through our research efforts is gratifying."

The annual SMART program, now in its 18th year, brings faculty, staff, and students at the university, and talented 10th and 11th graders from around the country together to conduct research while introducing them to issues in space science, environmental and marine science, and biotechnology and nanotechnology. The program is designed to help spur upper class high school students into careers in science and mathematics.

Altogether, SMART brought 44 high school students to UNH's Durham campus for the month of July. In each area of study, National Aeronautic and Space Administration (NASA) research and application tools play a central role in the form of imaging technology, modeling, and visualization methods.

Messier, Post, and fellow SMART environmental/marine science module student Alysha

McGrath - a rising senior at Pembroke Academy - used NASA Landsat satellite imagery in their research into cyanobacteria. McGrath and Post used the "remotely sensed" satellite images to help study the relationship between freshwater mussels in Lake Ossipee and the toxic blue-green algae.

Lake Ossipee is one of New Hampshire's more pristine bodies of water and it is hypothesized that the health of its mussel population is a key reason why.

Notes McGrath, "The mussels are filter feeders and we believe they are in part why the cyanobacteria count is so low in that lake because they're filtering out the bacteria." However, extensive human impact on the lake appears to be having a negative impact on water quality/bacteria levels. By using Landsat images the three students were able to pinpoint both the location and type of cyanobacteria affecting Lake Ossipee.

"This has been an exceptionally fine group of high school students this summer," says faculty advisor Barry Rock of the Institute for the Study of Earth, Oceans, and Space and the Department of Natural Resources and the Environment, "They have been very enthusiastic and eager to take on the challenges of field research even though the weather hasn't been very cooperative. Their projects have been great."

Adds advisor Jim Haney of the Department of Biological Sciences, "It is especially exciting that each of our projects resulted in new findings that will almost certainly lead to further investigations. Best of all, it was the students who made the discoveries."

In addition to the environmental/marine science module (11 students), this summer's modules in space science and bio-/nanotechnology hosted nine and 24 students, respectively. Among other activities, students in the space science module launched a high-altitude balloon for which they built a scientific payload to measure gamma rays and high-energy beta waves as the balloon wafted up to "near-space" at 98,000 feet. The payload descended by parachute over Concord and was retrieved.

Says faculty advisor Chuck Smith of the Space Science Center, "The onboard video camera obtained wonderful footage showing the Earth falling away and from maximum altitude it recorded the curvature of the Earth with black space above it. The payload was above the Earth's atmosphere. It was a great day!"

Teachers Lou Broad of Timberlane High School and Scott Goelzer of Coe-Brown Academy in Northwood helped guide space science students through their projects, including the balloon launch, over the four-week session.

Project SMART is funded through the New Hampshire Space Grant Consortium (NHSGC), the Office of the Provost, the College of Life Sciences and Agriculture, and student tuition. This year's session was also supported through grant funding from the Liberty Mutual Foundation and the U.S. Forest Service. The funds allowed the program to host its most diverse group ever by helping support under-served students who might otherwise not be able to afford the month-long residency.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 11,800 undergraduate and 2,400 graduate students.

### **Photos available to download:**

<http://www.unh.edu/news/img/sedimentcore-yorkpond.jpg>

A sediment core sample containing toxic cyanobacteria collected at York Pond.

<http://www.unh.edu/news/img/nema-aggarwal.jpg>

Project SMART student Nema Aggarwal with samples from small tide pools at the Isle of Shoals.

<http://www.unh.edu/news/img/yorkpond.jpg>

Project SMART students at York Pond.