

Hale Takes PBDE Research to the Air

Ospreys are once again harbingers of spring across Chesapeake Bay, thanks largely to regulation of DDT and other pesticides that had devastated the species' population during the mid-1900s. But the emergence of new environmental contaminants, including flame-retardant compounds known as PBDEs, is raising concern among scientists who study the birds.

VIMS Professor Dr. Rob Hale, a leading authority on the behavior of PBDEs in the environment, is collaborating with avian experts from around Chesapeake Bay to determine the exposure of osprey to these new contaminants, and to traditional pollutants such as DDT, PCBs, and mercury.

Hale's collaborators include Research Associate Reese Lukei of the Center for Conservation Biology (CCB) at William & Mary, as well as

scientists at the Patuxent Wildlife Research Center, the U.S. Fish and Wildlife Service, the University of Maryland, and the U.S. Department of Agriculture.

Results of their research appear in the latest issue of the *Archives of Environmental Contamination and Toxicology*.

Hale is also teaming with CCB and W&M undergraduate Catherine Potter to study the effects of PBDEs on peregrine falcons. Because peregrines feed on other birds of prey from their perch atop the food web, researchers suspect they may be especially likely to concentrate contaminants in their tissues (see sidebar).

Hale's role in the osprey study was to analyze PBDE levels in eggs taken from nests along the Elizabeth River, Baltimore Harbor, and the Anacostia, Patapsco, and mid-Potomac rivers.

These are some of the most highly polluted areas of Chesapeake Bay.

The researchers removed a single egg from nests in these sites and compared their contaminant levels with eggs taken from nests along tributaries thought to be largely contaminant-free (a typical osprey nest contains three eggs).

They also followed the fate of the remaining eggs until they hatched and the chicks fledged. Ospreys in all but one of the contaminated sites showed only marginal success in breeding. Nests in the Elizabeth River and the pristine sites were sufficiently productive to maintain the local population.

Analysis of eggs from the contaminated sites showed that they often contained higher concentrations of PBDEs, PCBs, and DDE (a breakdown product of DDT) than eggs from the pristine sites. There was, however, no clear statistical correlation between individual contaminant concentrations and nesting success.

"There are likely additional factors at play that preclude a simple correlation between contamination levels and nesting problems," says Hale. "There may be other contaminants that we didn't sample for, or some of our known contaminants may have already been transformed by organisms and eliminated. Habitat loss probably also plays a role."

The migratory nature of many of the osprey's fishy prey, together with the bird's extensive hunting

range, may also help explain the lack of a clear correlation.

Most troubling, notes Hale, is that PBDE concentrations appear to be increasing in the osprey population. Levels are now four times higher in the Anacostia and Potomac rivers than in pristine sites.

Previous laboratory studies by Hale and graduate student Mark La Guardia show that exposure to PBDEs can alter reproduction and nervous-system development in many organisms.

For more about Rob Hale's work on PBDEs, visit www.vims.edu/env/research/envchem.html and the Fall 2001 issue of *The Crest*.

Faculty Help Launch Scholars Program

VIMS faculty helped inaugurate the new Hall-Bonner scholarship program during a ceremony at Hampton University on April 30.

The program is designed to increase the number of under-represented minority students earning Ph.D. degrees in marine and ocean sciences. It builds on the recognized strengths in graduate-level marine education at VIMS and Old Dominion University. Faculty will mentor Hall-Bonner scholars through the normal Ph.D.

curricula at either VIMS or ODU. The students will also take additional specialized courses at Hampton University.

The Program, which provides full support for tuition and stipends, is named for leaders in establishing marine science education at Hampton University—the late professor Anita Hall and the retired dean of the school of science, Dr. Robert Bonner. It is supported by a \$1.1 million award from the National Science Foundation.



Pictured from L are Dr. Gene Burreson and his student Ms. Delonna White, Dr. Linda Schaffner and her student Ms. Treda Smith, Mr. Leonard Pace, Dr. Rom Lipcius, and Ms. Andrea Roche and her advisor Dr. Margaret Mulholland (ODU). Not pictured are Dr. Jack Musick (mentor to Mr. Pace), Dr. Mike Newman and his student Ms. Erica Holloman, and Dr. Lipcius' student Mr. Justin Falls.



Donna Grusha

A mother osprey tends her two chicks in a nest just below the Coleman Bridge.

Preliminary research by Dr. Rob Hale and W&M undergraduate Catherine Potter is helping to throw light on the potential effects of PBDEs on peregrine falcons.

An endangered species, peregrines suffered dramatic population declines at the hands of pesticides in the years following WWII. By the early 1960s all known breeding pairs east of the Mississippi had disappeared.

Restoration efforts, including significant work by the Center for Conservation Biology (CCB) at William & Mary, have helped to re-establish a peregrine population in Virginia. In 2001, CCB staff counted 16 breeding pairs of peregrines in Tidewater.

Hale and Potter are hoping that their research will help this nascent population maintain its upward but erratic course by identifying any contaminants of concern before they might begin to affect the bird's reproductive success.

Potter, who is pursuing the research for her senior thesis in Chemistry, has found that the thickness of peregrine eggs decreases with increasing PBDE concentration. Hale notes that Potter's results confirm previous work from Sweden.

"Catherine's research also shows the great opportunities for collaboration between VIMS scientists and undergraduates on the main campus," adds Hale.

For more information on CCB's peregrine restoration program, visit fswb.wm.edu/ccb/index.html