

## Duke brings Superfund research to the Elizabeth River Learning Barge

By Sara Mishamandani

The end of 2013 marks the first full semester of Duke University Superfund Research Program (SRP) field work and outreach on the Elizabeth River Project (ERP) Dominion Virginia Power [Learning Barge](#).

(<http://www.elizabethriver.org/#!the-learning-barge/c11py>)

Duke SRP partnered with ERP to develop content and materials for the floating classroom, now in its fifth year of operation, as well as complimentary materials for fourth grade teachers back in the classroom. ERP is a nonprofit organization that leads community efforts to restore the environmental health of the Elizabeth River in southeastern Virginia.

Hundreds of elementary school students in the Chesapeake Bay area make field trips to the Learning Barge each year, to learn about river environmental stewardship and how to make the polluted Elizabeth River swimmable and fishable by 2020. Members of the Duke SRP Research Translation Core (RTC) developed a new teaching module on adaptation, using Duke SRP research concepts, which launched on the Learning Barge in fall 2013.

"Adaptation is part of the fourth grade science curriculum, but something students often test poorly on. It is a difficult concept for students to understand without seeing it firsthand," said Robin Dunbar, the ERP Education Director. "Duke's activity on the Learning Barge helps students make the connection and understand the concept of adaptation in a way that cannot be done in the classroom."

### Duke research on the Elizabeth River

Researchers at the Duke Superfund Research Center, led by Richard Di Giulio, Ph.D., are conducting research on the Atlantic Wood Industries Superfund site located on the Elizabeth River (see [story](#)). The site, a former wood treatment facility, left the Elizabeth River heavily contaminated with polycyclic aromatic hydrocarbons (PAHs).

Duke investigators are working to better understand how the PAH contamination in the Elizabeth River is affecting fish populations. They have discovered that a small killifish species in the Elizabeth River, the *Fundulus heteroclitus*, or mummichog, has developed resistance to acute toxicity, heart deformities, and cancers that are linked to PAH exposure. Duke researchers continue to study how this adaptation to PAHs may impact killifish health later in life.

### Translating findings to fourth graders

On the Learning Barge, students attend a fifteen-minute fishing station where they can fish off the side of the barge for samples. Students observe their catch, as they hear about how organisms living in the Elizabeth River, such as the mummichog, have had to adapt to survive, and the costs of that adaptation. The script, developed by Duke RTC, brought in elements of Duke SRP research, while fulfilling specific concepts, in accordance with the Virginia Science Standards of Learning.

"Duke investigators are studying the concept of adaptation at a very high level," said Dunbar. "The Duke RTC was able to take it down to where it begins, so students can understand."

To complement the field trip, Duke SRP staff also developed resources on adaptation for fourth grade teachers, available on the [Duke SRP website](#).

(<http://tinyurl.com/k7s8xaf>)

Resources include a factsheet on *Fundulus heteroclitus*; a worksheet with a fictional story

describing adaptations to PAH exposures and associated fitness costs; and questions for evaluating student understanding.



*The Learning Barge is the world's first floating wetland classroom, powered by sun and wind, and equipped with live wetlands, an enclosed classroom, composting toilets, and a rainwater filtration system. (Photo courtesy of Elizabeth River Project)*



*Fourth graders on the Learning Barge examine their catch from the Elizabeth River. (Photo courtesy of Elizabeth River Project)*



*Duke researcher Savannah Volkoff, right, sorted mummichogs during a fish collection trip on the Elizabeth River. She worked with Kroeger to develop the Learning Barge activity and materials. (Photo courtesy of Savannah Volkoff)*

"The Learning Barge activity was a great opening into working with the Elizabeth River Project, and we hope to have a more active role with the organization in the future," said Gretchen Kroeger, the Duke RTC project coordinator. "It was also a lot of fun to see the learning module in action and to see how the students were really engaged in the activities."

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

---

The Environmental Factor is produced monthly by the [National Institute of Environmental Health Sciences \(NIEHS\)](#)

(<http://www.niehs.nih.gov/>)

, Office of Communications and Public Liaison. The content is not copyrighted, and it can be reprinted without permission. If you use parts of Environmental Factor in your publication, we ask that you provide us with a copy for our records. We welcome your [comments and suggestions](#). ([bruskec@niehs.nih.gov](mailto:bruskec@niehs.nih.gov))

This page URL: NIEHS website: <http://www.niehs.nih.gov/>

Email the Web Manager at [webmanager@niehs.nih.gov](mailto:webmanager@niehs.nih.gov)