My Two Boots ... A Walk Through the Wetlands. An Annual Outing for 700 Middle School Students

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Let every individual and institution now think and act as a responsible trustee of Earth, seeking choices in ecology, economics and ethics that will provide a sustainable future, eliminate pollution, poverty and violence, awaken the wonder of life and foster peaceful progress in the human adventure.

—John McConnell, founder of International Earth Day

Project WetKids (www.projectwetkids.net) provides wetland, environmental, estuary, and watershed experiences with local scientists, engineers, and naturalists to Pascagoula, Mississippi students and their families. Extensive activities provide participants: (1) real world, locally relevant science-based events (2) meaningful scientific experiences and interactions with field scientists, and (3) exposure to science, technology, engineering, and mathematics career opportunities in the Gulf Coast region.

The Project WetKids program and accompanying research were funded by the National Science Foundation (Grant #0639629) and have been further supported by local and regional partners. Our extensive partnership includes: the Pascagoula River Audubon Center, NOAA Fisheries Laboratory of Pascagoula, Chevron Pascagoula Refinery, Northern Gulf Institute, Gulf Coast Research Laboratory, John C. Stennis Space Center, and Northrop Grumman Incorporated. In addition to developing and providing these rich watershed experiences, our university-based research team is documenting and analyzing Project WetKids’ impact on students’ science content knowledge, scientific aspirations, and views of science learning in experimental and quasi-experimental studies (Davis, Cwikla, & Barry, 2008) and more results will be forthcoming (Cwikla & Barry, 2009).

The idea and concept for Project WetKids was spawned in part from the success of the annual “My Two Boots” event in the Pascagoula School District (PSD). This day-long event for 700 Pascagoula and Gautier sixth-graders tackles wetlands and environmental sciences in concert with our diverse coastal resources and unified communities (http://psd.schoolwires.com/psd/site/default.asp). One of the District’s goals is to prepare students for the statewide Biology I Subject Area Testing Program in the ninth grade. PSD has repeatedly earned performance in the top 10% of all school districts in Mississippi. Science departments have accordingly expanded course offerings to include astronomy, genetics, zoology, marine biology, AP Chemistry, and AP Biology, with an emphasis on student-centered activities and hands-on learning. PSD has documented dramatic increases in student achievement with the designation of two of its secondary schools as National Blue Ribbon High Schools. We attribute part of PSD’s success to the exceptional out-of-school activities and non-traditional offerings it provides for its students.

One example of the wetlands and environmental focus in PSD is the annual “My Two Boots ... A Walk Through the Wetlands” event. For the past six years, Ms. Sybil Wilner, a middle school Language Arts teacher, and Mr. Billy Walker, a high school science teacher, have worked together to provide a day-long event that brings together all sixth grade students from PSD and a neighboring parochial school. These children join with high school students; District science teachers; Audubon Master Naturalists; and local, state, federal, and industrial scientists to experience immersion into the Mississippi Wetlands.

O Theoretical Framework & Program Development

While PSD has focused on data-driven and collaborative teaching practices to improve student learning, the data for our nation as a whole are clear and consistent in their message: Students in the United States are continually outperformed in mathematics and science by their international counterparts (e.g., Trends in International Mathematics and Science Study, 1995 [http://timss.bc.edu/timss1995.html]; 1999 [http://timss.bc.edu/timss1999.html]).

As part of this large study, the Third International Mathematics and Science Study (TIMSS) video analysis and others’ work investigating teaching practice indicate a
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How did My Two Boots get started: It started five years ago when Mary Ann Taylor and I (Sybil Wilner) went through The Coastal Wetlands Workshop sponsored by Chevron and under the direction of Dr. Mark LaSalle. It was a wonderful experience learning about the different coastal resources we have along the Mississippi Gulf Coast. We returned from our workshop enthusiastic and excited about sharing our experience with our students. We planned a wetland unit and several field trips to spark a desire in our students to learn more about how to preserve the coastal resources found here in South Mississippi. We visited Honey Island Swamp, sifted through a catch at NOAA, hiked along the edge of a marsh, and spent an entire school day at Gautier High with Master Naturalists learning more and more about coastal wetlands. Mr. Billy Walker, who has also been through The Coastal Wetlands Workshop, was our contact person at Gautier High that helped make our trip to his school possible. Since our first trip to Gautier High, Mr. Walker has worked with Mrs. Taylor and me to expand our project to other sixth grade students throughout the district. Schools participating in the My Two Boots campaign this year are Colmer Middle, Gautier Middle, Trent Lott Middle, and Resurrection.

What is the purpose of My Two Boots: Wetlands need our help! My Two Boots is a project designed to introduce students to Mississippi’s wetlands. With this project students learn what wetlands are and what the many values of wetlands are, how to identify the different types of wetlands, and how they can help protect them. Students learn about the animals and plants which inhabit them. They also learn why these special communities were destroyed in the past and what must now be done to save them. As teachers, we are committed to teaching students that these wetlands are priceless natural treasures that must be preserved and protected.

My Two Boots will include:

- An integrated curriculum that follows MS State Benchmarks
- Master Naturalists
- Professionals
- Businesses
- Storytellers
- Artists
- Sportsmen
- Technology
- Publicity
- Students
- Teachers
- Parents
- Community leaders

lack of mathematical and scientific depth and conceptual relationships in a typical United States mathematics classroom (Stigler & Hiebert, 1999; Shimahara & Sakai, 1993). As a result, there is a critical shortage of U.S. students entering and pursuing science, technology, engineering, and mathematics related fields in higher education.

To encourage students’ interest and pursuit of the sciences, out-of-school learning should offer an interdisciplinary focus (Schinke, Cole, & Poulin, 2000; Sunal, Karr, Smith, and Sunal, 2003; Sunal & Sunal, 2002). Students should be challenged and learn about the sciences in context. In a review of out-of-school programs conducted by the Harvard Family Studies Project, Little and Harris (2003) found that out-of-school learning produced positive effects on students’ in-school attendance, participation, and attitudes toward school and higher education aspirations. The My Two Boots event, its interdisciplinary approach, and use of area scientists and naturalists was used as the basis and model to develop Project WetKids, an after-school and summer program for sixth, seventh, and eighth-grade students.

The Project WetKids program and the My Two Boots event focus on wetlands habitats and the surrounding Mississippi marshes, swamps, and barrier islands, providing rich experiences that emphasize higher-order thinking skills, project-based learning, and opportunities to solve problems that have multiple solutions requiring a high degree of initiative. All of these components are associated with higher performance by fourth- and eighth-grade students on the National Assessment of Educational Progress (NAEP) in both mathematics and science (Wenglinsky, 2004).

The My Two Boots event was a direct product of the Teachers’ Wetland Diversity Workshop, a science-based continuing education program funded by a local industry sponsor (Chevron Pascagoula Refinery) and developed by Dr. Mark LaSalle, Director of the Pascagoula River Audubon Center. Conducted annually since 1994, this five-day program was designed to target a small (15) but motivated group of teachers selected by each of the four school districts from the local county. These teachers are subsequently immersed in the structure and ecology of local wetlands through direct experiences over the course of an academic year. The key requirement for completion of this program is the development of a lesson plan model that incorporates the concepts learned through the workshop. The My Two Boots event was a joint project submitted by Ms. Sybil Wilner and Ms. Mary Ann Taylor, middle school English and art teachers respectively from Trent Lott Middle School. It has grown into an extremely successful annual event in which Gautier High School hosts the District’s 700 middle school students.

A number of the PSD teachers have also participated in the Audubon Teacher Master Naturalist training program also funded by the Chevron Pascagoula Refinery and directed by Dr. LaSalle. This 10-week program focuses on local habitats and models scientific inquiry and habitat exploration, providing the teachers opportunities to explore the content areas in advance of their students.

The My Two Boots Evolution

Each year on a selected October morning, all PSD sixth-grade students arrive by bus at Gautier High School. More than 75 vol-
Volunteers await them, offering 27 stations to teach them about the Mississippi wetlands. The grounds of Gautier High School include a wetlands with an extensive boardwalk as well as a large pond at the entrance. Introductory flyers are sent home with the students prior to the event.

When they arrive, students receive folders with worksheets describing the topics and the stations. The folders are color-coded by school and students are requested to wear corresponding colors. An opening assembly in the gym describes the day’s activities and logistics.

Small groups of students (10-12) visit each station listening to presenters from state and federal agencies, universities, community colleges, non-profit organizations, and volunteer groups. They include the: National Oceanic and Atmospheric Administration (NOAA), U.S. Fish & Wildlife Service, Mississippi Sandhill Crane Refuge, U.S. Environmental Protection Agency, Grand Bay National Estuarine Research Reserve, Pascagoula River Audubon Center, Mississippi Coast Audubon Society, The Nature Conservancy, University of Southern Mississippi Gulf Coast Research Lab, and Mississippi Gulf Coast Community College. (See Table 1 for a list of the stations from the 2008 event.) Student groups rotate through three stations before lunch and four stations after lunch. The event concludes in the early afternoon and students return to their schools by bus.

Table 1. 2008 Station Descriptions.

<table>
<thead>
<tr>
<th>STATION</th>
<th>TOPIC</th>
<th>FACILITATOR</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Environmental Technology, Storm Water Runoff, Water Pollution</td>
<td>• MS Gulf Coast Community College</td>
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<tr>
<td></td>
<td></td>
<td>• Mississippi Wildlife Federation</td>
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<tr>
<td>2</td>
<td>Artists – Specimen rubbings, sea stars, fish, and crabs</td>
<td>• Local artists and PSD Art Teachers</td>
</tr>
<tr>
<td>3</td>
<td>Birds – Great Backyard Bird Count</td>
<td>• Mississippi Coast Audubon Society</td>
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<tr>
<td></td>
<td></td>
<td>• High School Students from Resurrection Catholic School</td>
</tr>
<tr>
<td>4</td>
<td>Wetlands</td>
<td>• PSD WetKids and WetKids Teachers</td>
</tr>
<tr>
<td>5</td>
<td>Endangered Species</td>
<td>• MS Sandhill Crane Refuge</td>
</tr>
<tr>
<td>6</td>
<td>Outdoor Recreation – Kayaking and Boating</td>
<td>• MS Gulf Coast Community College</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bayou Wildlife Management Area</td>
</tr>
<tr>
<td>7</td>
<td>Fisheries – Fish Identification</td>
<td>• National Oceanic &amp; Atmospheric Administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• USM Gulf Coast Research Lab</td>
</tr>
<tr>
<td>8</td>
<td>Storytellers of the Gulf Coast</td>
<td>• John J. Audubon Impersonator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Local Naturalist / Outdoorsman</td>
</tr>
<tr>
<td>9</td>
<td>Wildlife</td>
<td>• Grand Bay National Estuarine Research Reserve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Audubon Master Naturalists</td>
</tr>
</tbody>
</table>

At each station’s tent, students spend 25-30 minutes learning about a particular wetlands-related topic. Presenters provide students a variety of formats throughout the day. These might include: a hands-on experience with living or preserved specimens, a question-and-answer session about boating or hurricane prediction, a walk through the marsh providing bird and plant identification, directions on the use of binoculars for spotting and identifying birds, lessons on water-testing procedures followed by collection and testing, and instruction throwing a cast net. There are also opportunities to learn from local storytellers and artisans. Each year there is some variation, depending on the volunteers and facilitators.

At the October 2008 event, Dr. LaSalle, Director of the Pascagoula River Audubon Center, recruited Project WetKids students from the participating PSD schools to direct the wetland stations, and high school students from the Resurrection Catholic Schools to direct the birding stations. With the assistance of the WetKids teacher leaders, the WetKids prepared and led three stations to teach their peers about water quality and water testing, birding, making suet, and throwing a cast net.

The students from the Resurrection Schools taught each student how to adjust and use binoculars, and how to look for key bird identification characteristics. In each case, the idea was to provide opportunities for students to share their knowledge through peer teaching. Although not unique to this program, the use of older students to teach and mentor younger ones will be a key component of future efforts with the Project WetKids program as the original participants move beyond the middle school years. The My Two Boots team will also continue to use this peer mentoring approach to share its conservation and environmental knowledge.

Emma Mitchell, one of the peer mentors, shared the following:

I thought My Two Boots was a great program to teach kids about the environment they live in and the different ways to help keep it clean. I taught the kids how to look for birds and what types of birds there were in the area that they could look for. I could tell they were having a great time by all of the questions they were asking us. My Two Boots was a great experience for me and I hope that I will be able to do it again.

Dr. Jennifer Walker, a biology professor from the University of Southern Mississippi, shared a collection of vertebrates and invertebrates with the students. They were intrigued by the way snails form their extraordinary shells over time and were able to com-
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BIRDS

Approximately how many different kinds of birds can Mississippians see along the coast during the year?

Name three birds common to wetlands.

Birds are the only animals with feathers. They have two main types of feathers. Name the two main types of feathers.

Why is preening important for birds?

What are two ways feathers protect birds?

Some birds have short pointed bills, some birds have long narrow bills, others have heavy, sharp, hooked bills, and others have flat, wide bills. What does this characteristic tell us about birds?

Why do some birds have webbed feet?

Why do some birds have long legs and large feet?

Students complete their worksheets in the My Two Boots folder throughout the day, creating a record of what they have learned about the wetlands. Several stations, like the topographic pollution model above, discuss the ways students can work with their families to decrease their household carbon footprint and protect our surrounding wetlands. For the past six years, the exploratory day has proven a tremendous success based upon student, parental, and teacher feedback as well as students’ sustained interest in Project WetKids.

Sixth Grade Student Reflections

The following day, the sixth-grade students return to the classroom and write thank-you notes to all the volunteers and facilitators. In addition, they write a reflection about their “Favorite My Two Boots Experience.” Excerpts from students’ reflections follow:

“I really appreciate the trip to My Two Boots. The part I liked the most was kayaking. There was nothing I didn’t like because everything was just so inspirational to make you care a lot more about wetlands. Thank you Ms. Wilner!”

“The TED turtle net was the best. It would have been better if we could stay at some of the things longer. Touching and holding the alligator and snake was awesome!”

Figure 3. Example for handout in student folder.

Figure 4. Live animals — turtles, snakes, alligators, crabs, and more — add much to the learning experience.
Beyond My Two Boots

The Mississippi Science Framework competencies and objectives build upon students' exploration of structures and functions in living systems; populations and ecosystems; diversity and adaptations of organisms; properties and changes of properties in matter, motions, and forces; transfer of energy; structure of the Earth system; and Earth's history. These competencies are required to be taught in the sixth through eighth grades. Emphasis is on developing the ability to ask questions, observe, experiment, measure, use computer and calculators, problem solve/reason, use tools of science to gather data, and to communicate findings.

The Mississippi State Standards require that sixth-graders explore and examine, seventh-graders compare and contrast, and eighth-graders analyze specimens. The My Two Boots event provides sixth-graders hands-on experiences to explore and examine specimens, and take this knowledge back to the classroom. Pascagoula Middle School students are studying life and physical sciences, using the Glencoe published investigations as their major classroom text. Teachers supplement with activities from the digital curriculum available in the District's Center for Teaching and Learning, and also draw from a variety of online science source supplements (e.g., The Jason Project [www.jason.org], Mississippi Department of Marine Resources [www.dmr.state.ms.us/Kids/kids.htm], and NOAA Education Resources [www.education.noaa.gov]). The out-of-school field and science experiences make a lasting impression on PSD's young students. Pascagoula High School student Andrew Coleman thinks he might study engineering and thoroughly remembers the My Two Boots event when he was in sixth grade.

Figure 5. Students learn about large aquatic reptiles and marine life that most only read about.

We went through the entire (Gautier High School) campus pretty much and learned all kinds of things about Mississippi that we wouldn't have if we hadn't gone to that program. We learned about the nets that shrimpers used so turtles don't get caught and got to crawl through it. We walked on the boardwalk, through the woods, and they had different people speaking about birds in Mississippi. We also learned about people that go out and make sure endangered species get protected and everything.

Eleventh-grade student Andrew Baker recalls the event five years ago.

We did wetlands projects, saw the carnivorous pitcher plants, went out and saw birds they had tagged recently. Everything I learned about there I'm still learning about it now at the high school, alligators, birds, reptiles; just more advanced.

My Two Boots and Project WetKids provide rich out-of-school experiences that cultivate students' interest and appreciation for the sciences. The Project WetKids explorations involve students at all three middle grade levels as well as a handful of high school student mentors. They conduct field work in the same location focused on a particular level of the habitat (e.g., grasses and bottom dwellers) but their experiments, analyses, and presentations have different requirements that are grade-level appropriate and aligned with the Mississippi State Standards. Because Project WetKids leaders are from both middle and high school levels, the curricular connections across grades are well articulated. Moreover, middle school students have the opportunity to work with and get to know the high school science teachers prior to their high school entry. The WetKids students develop a sense of belonging to the larger science community and overall have more positive feelings about their teachers and their school compared to a non-participating control group (Davis, Cwikla & Barry, 2008). A WetKids teacher shared, "If we can spawn some interest in science, there's a new generation of kids growing up, they need this stuff and if they're not going to get excited about it in school, then where else... This (Project WetKids) is the best thing to happen to some of these kids!"

Providing a Sustainable Future

Hurricane Katrina unfortunately reminded all inhabitants on the Gulf Coast of the critical importance of wetlands in protecting our shrimp industry, fisheries, oyster beds, homes, leisure activities, birds, barrier islands, and the natural equilibrium that nature will achieve regardless of the outcome. Because half of the United States population resides on our coasts, it is essential that we learn how to protect our natural resources. Understanding the important role that wetlands play is critical for students in this country and worldwide. Although we are all working to encourage more students to
enter the science, technology, engineering, and mathematics fields of study, it is also important to develop citizen scientists and children’s appreciation for our natural world.

Students at all grades levels should be exposed to out-of-school experiences in their natural environments through field trips (Krupa, 2000), events like the My Two Boots outing, and programs like Project WetKids. All too often, children spend their out-of-school time in front of the computer or the television, overlooking the amazing habitat right outside their front doors where ants are diligently stockpiling, the mathematical fractals of the fern unravel, and the storm drains are impacting their drinking water. Instead, real-world field experiences, such as those offered by the My Two Boots event and Project WetKids, have the power to inspire young scientists and plant the seeds to encourage their eventual pursuit of science-based career paths.

The middle grades provide a critical window to inspire students. Tai, Liu, Maltese and Fan’s (2006) work in Science, evaluating the large-scale longitudinal NAEP data, indicates students in eighth-grade who stated a possible career interest in the hard sciences were significantly more likely to eventually pursue these fields as adults. In other words, we need to catch students before they enter high school and encourage scientific discovery to have long term impacts on our environmental scientific workforce.

References


