"Just Keep Swimming"

The story of Shad in the Schools in North Carolina

By Patty Matteson, USFWS

On the day of the release, you could hear squeals of delight and students chanting "just keep swimming" while hundreds of juvenile American shad were released into the local waterway.

This spring two local schools in Raleigh, N.C. grew American shad, a migratory fish, in their classroom for release into a local waterway. The students, 6th and 8th graders in the Wildlife Club at Centennial Campus Magnet Middle School and Anna Brozell's 4th Grade class at Leadmine Elementary School, took part in this pilot project sponsored by the U.S. Fish and Wildlife Service in Raleigh.

American Shad is a migratory fish that spawns in freshwater rivers along the East coast but lives its life in the Atlantic Ocean. "It is the East Coast version of the Salmon," said Sandy Burk, Author, "Let the River Run Silver Again, *How One School Helped Return the American Shad to the Potomac River*…."

It was her book that inspired Mike Wicker, Coastal Program Coordinator, U.S. Fish and Wildlife Service (USFWS), Raleigh Field Office, and myself, the public affairs and outreach coordinator for the office, to create a program in North Carolina. This program supports the USFWS initiative which is to, "Connect People with Nature: Ensuring the Future of Conservation," and the national initiative, "To Take a Child Outside." Here at our office, we do not have the luxury of one of our 10 National Wildlife Refuges in North Carolina being close by. The closest refuge is a two hour drive from Raleigh. So we needed something we could do locally.

The objective from the birth of this program has been to create and maintain a program that will allow the teachers to teach a hands-on-learning experience that enhances the North Carolina standards of learning. Mr. Wicker and I hope it will make students, teachers, and parents more aware of the issues facing migratory fish. We are hopeful that they will gain and foster an appreciation for their local watershed.

"The American Shad has a great historic significance to our heritage in North Carolina," said Mr. Wicker. "I am so pleased that the teachers and administrators at the two local schools we partnered with took the chance and let us bring fish into the classroom," he said.

COMING TOGETHER

It was Elwood Peters, the outreach coordinator with Centennial Middle Magnet School who put us into contact with Mrs. Betty Welsh, 8th Grade Science Teacher at Centennial. Fortunately for us, they both saw the potential of the program and helped to shape its growth. Centennial has a Wildlife Club that meets after school and is comprised of some very inquisitive and astute 6th and 8th graders. This is where we were able to initiate the program in Centennial.

Ms. Burk's book, "Let the River Run Silver Again," was released in 2005. It tells the story of the first elementary school in the nation that helped in the restoration effort of the American shad in the Potomac River. This effort began in 1995 and has continued in the Washington, D.C. area since that time.

Since the program works so well in an elementary school setting, we really wanted to find and an elementary class here in North Carolina. Fortunately, a good friend of mine,

Mrs. Brozell, had just received an offer to teach a 4th grade class at Leadmine Elementary School whose teacher was departing. "This program fits so nicely with the North Carolina curriculum," Mrs. Brozell said. "It allows us to bring something into the classroom that is living and can be released locally," she said.

Besides the USFWS, there are many state, public and private groups who were involved in the success of this program. The hatchery used to grow the fish and some of the educational materials were obtained from Living Classrooms, a non-profit organization that runs a "Schools in Schools" program in the Washington, D.C. area. Their motto is "Learning by Doing." They currently work with more than 85 schools in the D.C. area to raise shad in the classroom each spring.

The N.C. Chapter of the American Fisheries Society (AMFS) paid for Mrs. Brozell and Mrs. Welsh to attend the training and purchase the fish hatchery.

"I absolutely loved the training," said Mrs. Welsh. "I learned so much and I am very excited for our students," she said. "So much of the program is applicable to what we are learning in 8th grade, and not just in science, it also fits in nicely with history and social studies," she added.

Before we knew about Living Classrooms, Stephen Jackson, Supervisor Fishery Biologist, Edenton National Fish Hatchery, and Jeff Evans**,** Superintendent, Watha State Fish Hatchery Manager, developed a system that can be used to grow shad. It consists of an aerator, 2-liter soda bottle, a small aquarium air pump, tubing, an airstone, and a drinking straw. To test this version Dr. Joe Hightower, Assistant Unit Leader Fisheries, North Carolina State University, and Education chair of the N.C. Chapter of AMFS, grew shad in his office at N.C. State.

"I think this is a great program because it gets students excited about nature," said Dr. Hightower. "It makes the students aware of some of the exciting career choices such as working as a fish or wildlife biologist," he added. "Also, a key part of the program is that students get hands-on experience in hatching fish eggs and releasing the fry into the stream," he said.

CONNECTIONS

Getting students out in nature and having a deeper understanding and connection to why the shad is important today, and what it meant to North Carolina in the past, was an important part of the program. Fortunately many organizations both public and private were willing to help step into that role.

Some of the most enthusiastic support came from Ryan Pruitt, Outreach Coordinator for the Triangle Fly Fishers Association. Mr. Pruitt, who works fulltime for Nortel, had wanted to start a trout in the classroom program in the area. As Mr. Pruitt and I found out, one of the biggest obstacles to starting a program is getting a teacher interested in allowing you into their classroom. "I am so pleased that the U.S. Fish and Wildlife Service wanted to start this program in North Carolina," Pruitt said. "I know an organization like the Service will be able to make it happen," he said.

Mr. Pruitt was instrumental in planning a fishing outing on the Neuse River at the base of the dam. He could not have been more patient teaching the children the proper technique in fly fishing. "Some of the children picked fly fishing right up, but others preferred spinning gear and worms," Pruitt said. "I think if we could have got some blue

gill to hit top water flies we'd of had many new fly fishing recruits," he said. "All in all I think the day turned out well, but next time we'll have to invite the fish," he said.

Fortunately, we had a shad expert at the fly fishing event – Ms. Burk. Even though we didn't catch any shad, there were shad that had been caught and left along the banks. She was able to show the students the fish and to even cut one open and show the student shad roe. "I sure wish I knew how fresh this is," Ms. Burk said. "If I knew it was fresh, we could cook it up and eat it," she added. "I can't believe that someone just left it here," she said. "Obviously they did not realize what shad in Latin 'alosa sapidissima' translates to which is 'most delicious,'" she added.

Students, through their research, had learned that water pollution is one of the reasons for the decline in American Shad populations. The Neuse River clean-up was taking place during the spring and the teachers and students were invited to participate in this worthwhile effort. "What a great opportunity this was for community service to be a part of the program," said Wicker.

Another fun and educational outing for the students consisted of a field trip led by Mandy Hall, Lauren Witherspoon, and Steve Reid from the North Carolina Department of Natural Resources, Division of Water Quality, Surface Water Protection Raleigh Regional Office. They took the students from the Centennial Wildlife Club to Walnut Creek below Lake Raleigh to test the waters and see what aquatic life existed. "The oxygen level and the pH levels look good," said Hall to the students during the outing. "I am actually pleased to get this high of an oxygen reading," she said. "Your fry should be able to survive and thrive," she said.

Other students were busily checking out with a dip net what they could find living in the creek. "Some of these will be food for your fry and others might eat the fry," said Lauren Witherspoon, as she and the students dipped the nets in and gazed at their findings.

Students also were given a lesson on the significance that the fish played in Native American history. At the training class in D.C., the teachers purchased the book "*When the Shad Bush Blooms,*" by Carla Messinger with Susan Katzs, to share with their class. This is a story of a Native American girl who was a member of the Lenape people. The book depicts the change of the seasons and compares and contrasts traditional and modern day life for this Native American girl.

Native Americans knew that the shad were returning to the rivers when the shad bush bloomed. "Native Americans grew tired of eating deer meat during the winter and were very excited to see the shad bush bloom," Burk said during her presentation to the 4th grade class at Leadmine Elementary.

The shad bush is any of the various North American shrubs or trees of the genus *Amelanchier*. People may know them by the name "Saskatoon Berry," "Serviceberry" and/or "June Berry." To help commemorate the shad in the class program, students planted a shad bush on each of the two participating school campuses.

Besides being important to the Native American's diet, shad is also important to the bald eagle. During her presentations at the schools, Ms. Burk stressed the importance of shad in the food chain.

The students took this information and incorporated it into their classroom projects. The Centennial Wildlife Club presented the shad project at a Middle School Education

Global Association event at N.C. State University in May. In their presentation, the students stressed the importance of a healthy shad population to the continued recovery of the once endangered bald eagle.

In Mrs. Brozell's class, the students used their time on the computer visiting the various eagle cam sites along the East coast. The U.S. Fish and Wildlife Service eagle cam at the National Conservation Training Center in Shepherdstown, W. Va. and the cam at the Norfolk Botanical Garden, Norfolk, Va. were the two the students enjoyed viewing the most. Many times the students observed the eagles feeding their offspring fish that look like shad. "In 4th grade we are teaching the children about connections and this couldn't be emphasized more than with the eagles and the shad," said Mrs. Brozell.

GETTING READY

Before the shad eggs arrived, and much like expectant parents both human and wild, the accommodations that would house the offspring had to be assembled. Students at both schools were amazed at the design of the hatchery and were excited to learn that it is based on the same design used at national fish hatcheries. Once assembled, the students were tasked with creating the environment that would support the eggs and help turn them into fry. This is where learning about proper pH levels and water temperature from the earlier field trip paid off.

Apprehension of the impending arrival became more apparent as the days grew closer. "One of the teachers at the training class told me that all of her fry died the first year she did the program," said Ms. Welsh. "I sure hope that doesn't happen to us," she added.

Unlike the program in the Washington, D.C. area, the students here do not go out and

catch the fry with local watermen and squeeze the eggs out of the female and mix it with the milt from the male. Here we had to rely on the state or federal hatchery to provide the eggs. In the spring, the hatchery employees are extremely busy. They are out on the rivers catching a variety of fish, and bringing them back to the hatchery to spawn. The number of eggs we asked for was a small amount compared to the millions of fry that they release each year in the state's local waterways. With an email and a confirmation phone call, we would be getting our eggs from the state hatchery at Watha. So with several coolers in a USFWS vehicle, Mr. Wicker took off to the hatchery.

ARRIVAL

Water testing become imperative at both schools. Too hot of a tank and the fish would be hatching too soon, or could die. And, too cold of a tank could make them not hatch in time for the release. So students were busy testing and retesting their tanks before the arrival.

Mr. Wicker arrived from Watha a little before lunch. The students at Centennial and Dr. Hightower were the first to receive their eggs. The students at both schools received a little more than 10 milliliters of eggs which accounted for 3,000 to 4,000 eggs.

Fortunately, Ms. Burk stayed for the arrival of the eggs and was there ready to help us through the details. Besides the wildlife students in the science lab, Mrs. Welsh's 8th grade science class was present. Many could not wait to catch a glimpse of the tiny shad eggs. One of the students said "they look like pearls."

To acclimate the eggs to the water temperature, the bag with the eggs inside was placed in the water in the hatchery. It would take several minutes before the water in the bag was the same temperature as the water in the hatchery. Once it was deemed safe the

eggs were removed from the bag.

"You will be in seniors in high school when this shad are returning to spawn in the local waterways," said Ms. Burk. "I am so pleased that you are doing this now in North Carolina," she said.

Next Ms. Burk and I went to Leadmine; the students were so excited to finally see the eggs. Students took photographs of each other touching the bag floating on top of the water. All eyes were on the hatchery when the eggs were poured into the small plastic cylinder. The eggs immediately started bubbling inside the chamber just like the students learned they would do. The bubbling action in the small plastic cylinder mimics the river habitat. If not for the water flowing through the hatchery, the eggs would sink to the bottom and stick together without hatching.

One of the most tedious projects the students had to perform was picking the dead eggs out of the hatchery. In the wild, the eggs that don't hatch end up as a food source in the river's habitat. However, in the hatchery, too many dead eggs could cause the ammonia levels in the water to spike and cause a larger die-off. Getting the students to do this job several times a day did not prove difficult. "I could do this all day," said Davis, a Centennial Wildlife Club member. "This is so cool, I want to be a marine biologist when I grow-up."

Students in Mrs. Brozell's class were allowed to pick-out the dead eggs when they had completed their work and had done a good job. This proved to be a big motivator to good behavior in her class.

Mrs. Welsh smiled and told me that on day number two I was greeted by Andrew stating, "Mrs. Welsh, Mrs. Welsh you have to come in here and smell the tank," he said.

“It smells just like Cape Hatteras,” he added.

On Monday, day one, the eggs may have looked like small pearls, but by day two they were starting too look more alive. The students at both schools were squealing with delight and calling their classmates over to look at the eggs under the microscope. Under the microscope, the students could see the development of the eggs into fry. They could see them wiggling around in their protective jell-like shell with their eyes starting to develop.

By Wednesday, day three, the tanks were loaded with fry swimming around the tank. There were still dead eggs and eggs that had not hatched to contend with in the tanks, but the students at both schools were doing a great job keeping the hatcheries clean. When I went to check on the tank at Leadmine, the students skipped to the classroom door to greet me with big smiles across their faces. They could not believe how many fry were swimming around the tank.

Only two more days until release, and the anticipation was building. The students at both schools started to try and count the number of fry. And, the representatives at Living Classrooms gave a very accurate description of what the fry would look like “two eyes and wiggle.”

On Thursday morning, fry were happily swimming around in circles in the tanks at the schools. While walking to the classrooms, I would meet students and teachers in the hallway who had not been involved in the program, but were happily talking about the fry swimming around in the science lab.

At the end of day four, we saw a decline in the number of fry swimming in the tank at both schools. Now it was imperative to not only suck out dead eggs, but also dead fry.

Leadmine was dealing with a spike in ammonia even though they were keeping the tank clean. They were now loosing fry at a rapid rate. The students, teachers and I who thought we might be releasing thousands of fry into the water on Friday were now concerned if we would keep any alive. Ms. Burk's words were ringing in our ears "even releasing one or zero fry is a success." So we left that evening not knowing what we would find in the morning.

RELEASE

The first release was scheduled for Centennial. The fry were being released into Walnut Creek at the base of the Lake Raleigh Dam. Hopefully some would make it to the Neuse River and on to the ocean. It was truly a spectacular day. At least the weather was cooperating. Now the big question was if we still had some fry left. The students were standing over the tank smiling when I walked in the door. We did have fry left. I immediately had the students place the fry into the coolers that would serve as their temporary home. While we did not have thousands of fry to place into the stream, we did manage to have several hundred.

Dr. Hightower joined us for the release. Dr. Hightower, who raised only 100 fry in the two-liter bottle system, also had a large die-off overnight. But, he still had a few to add to the river. We surmised that the eggs we had received from the hatchery were more than 24 hours old compared to the ones in the D.C. program which are less than 12 hours old. "Next year, we should release the fry a day earlier, or figure out a way to feed them," said Mr. Wicker.

As we were driving to the release site, we picked up a local T.V. station reporter who was busy searching for us near the creek. Most of the students were quiet as we

approached the stream. But once we arrived they were excited to put their fry into the waterway. Students carefully scooped the fry into paper cups and walked to the stream where they knelt down to place the cups into the stream and watched as the fry swam away. The students could be heard saying "awesome," "wow look at them go," "head to the ocean," and even "come back soon." In less than five minutes all the Centennial fry had been safely placed into the stream.

Now it was onto Leadmine. Fortunately, Mr. Pruitt and his wife, Stephane, met me at the school to help with the release. Many fry had not made it through the night, but there were still many "two eyes and a wiggle" swimming around the hatchery. While the students were at an assembly, we carefully scooped the fry into the coolers for transportation and placed the coolers onto the bus. The Leadmine students were releasing their fish into the Neuse River below the dam at Falls Lake. Their fry would eventually make its way over the Milburnie dam onto a clear path to the ocean.

We carefully made our way down to the waterway to release our fish. Each child, along with some parents who joined us, carefully scooped some fry into their cups and released them into the water. Some lingered and gazed into the water like they could see the fish swimming away. Others quickly got back up to grab another cub full. Again the release was over too soon.

"I could tell that the children were excited about what they were doing," Pruitt said. "Children are our future and teaching them about nature and our impact on it at such an early stage is critical," he said. "Not every child will get the message," he added. "However, when departing the area to go back to the bus, I saw one little boy filling the coolers with trash, and I thought to myself now that child sees the big picture," Pruitt

said.

Next year when the shad bushes are blooming on the campuses at Centennial and Leadmine, Mr. Wicker and I hope we have more bushes to plant and more shad to grow in the classrooms in North Carolina.