Fifth Graders from Greenbriar West Elementary, Fairfax County, preparing to release their shad fry into the Potomac River below Great Falls under the guidance of Jeanette O'Connor of Living Classrooms.

# Virginia Schools American Shad Project 2007 Report

(ICPRB Report # 07-09)

By Jim Cummins, The Interstate Commission on the Potomac River Basin
Sandy Burk and Jeanette O'Connor, The Living Classrooms of the National Capitol Region

Success continues: The project accomplished much in 2007 with over 300 elementary and middle school students and eight teachers from five northern Virginia schools hatching and raising American shad fry in their classrooms, releasing approximately 13,800 to help restore this important fish to the Potomac and Rappahannock rivers. Students spent a day on the Potomac River on board Living Classroom's educational vessel, the *Half Shell*, an historic Chesapeake Bay buy-boat, learning firsthand about the ecological, cultural and historic importance of shad and bay environments. Students' enthusiasm for this project was incredible, they magnified their experiences, educating hundreds of additional students and their parents on the values of restoring this important fish to the Chesapeake Bay and it's tributaries through their own presentations and media coverage. This educational effort dovetails with a regionally managed shad restocking program undertaken with the Virginia Department of Game and Inland Fisheries. Under this program, a total of 4.3-million American shad were stocked into the Rappahannock and Potomac rivers in 2007. Since 1995, over 36-million shad fry have been stocked into the Potomac and Rappahannock rivers. We are seeing impressive results, with shad coming back in numbers that haven't been seen for decades.

Reflecting the multi-jurisdictional nature of the Potomac River, the Virginia students participated along with another 13 schools from the Washington metropolitan area, all working cooperatively on this initiative (Maryland and District of Columbia schools participated through funding from the Chesapeake Bay Trust). In total, this year's collective educational program released 29,800 shad fry, reached over 1,250 students and teachers and involved over 100 volunteers! Those are great numbers, the best so far!

Support from the Virginia Chesapeake Bay Restoration Fund made it possible for these schools to participate in this nationally heralded program. Started in 1996, the "Schools-in-Schools" component of this project has again provided boat-loads of meaningful Chesapeake Bay experiences. This program is part of a partnership with the Interstate Commission on the Potomac River Basin (ICPRB), Living Classrooms of the National Capital Region (LC-NCR), Virginia Department of Game and Inland Fisheries, Maryland Department of Natural Resources, Chesapeake Bay Foundation, and the Anacostia Watershed Society.

## *THE PROGRAM*

Training:

On March 24th, teachers and assistants from each school attended a regional training workshop where they learned about the history and restoration of shad in the Potomac and Rappahannock Rivers and their role in the project. Along with in-depth instruction, each teacher received a shad curriculum binder with instructions on how to raise and care for shad. They also received reading materials, including a copy of an award winning book on the project entitled *Let the River Run Silver Again!*,[1] to learn about the history the program, to prepare their students and to serve as reference resources. At the end of the workshop each teacher received a shad tank, filters, a tank stand, chemicals, test kits, and other supplies to take back to their classroom. Nine student assistants from a variety of schools were also in attendance, which clearly added to the success of the training.

Back at the classrooms after the workshop, teachers assigned students the responsibilities of setting up and monitoring the water quality of their shad tanks and preparing for the arrival of shad eggs to raise. Classes incorporated reading about shad and keeping journals about the progress of their tanks and later their shad eggs and fry, thus emphasizing the connection of literacy to science. While they prepared their tanks and waited for the arrival of the shad, each school was provided with an assembly presentation by environmental educators from Living Classrooms, most prominently Sandy Burk, author of "Let the River Run Silver Again." They were provided with an overview on the entire shad project, the student's important role in the project, and to answer questions on shad biology, aquaculture and other related topics.

Raising and Releasing the Fish:

During the evenings and into the nights of April and May, teachers and selected students went out on the fishing boats of the last remaining full-time commercial watermen in Fairfax County, Louis and Mike Harley, helping to net American shad from the Potomac River. Under the supervision of ICPRB biologist and project manager Jim Cummins, they traveled from Mason's Neck to just offshore from Mount Vernon, where they collected shad for their eggs to use for Virginia Department of Game and Inland Fisheries Rappahannock River shad restoration efforts. While on board they learned the history of fishermen and the importance of American shad to the ecology and economy of the river. They helped setting the nets, removing shad and other fish, stripping eggs from ripe female shad and fertilizing them with milt from the male shad.

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[1] "Let the River Run Silver Again' was awarded the Isaak Walton Leagues Conservation Book of the Year for 2005 and the Green Earth Book Award for 2006. It is part of the National Science Teachers Association's "Recommends" program. NSTA's panel of outstanding science educators recommends this book as "one of the best available supplements for science teaching." It's author, Sandy Burke, is one of the project's cooperating environmental educators.

They help count and take measurements of the shad, important data for understanding the recovery of the fish. Teachers and students photo-documented their work to share with other students when they returned to the classroom. Examples of their pictures are included at the end of this report (See Attachment III: Gallery of Pictures).

Early Monday morning, April 23rd, thousands of fertilized shad eggs, collected with students the previous Sunday night (the oxymoronic night of Earth Day), were delivered to all of the schools. Over the course of the following week, students were responsible for maintaining the water quality of their tank as the chemistry changed due to the developing eggs, caring for the eggs, and removing any that were no longer viable. Students used math skills, learning to subsample and estimate the number of eggs they received and the percentage of eggs which survived to release. They used microscopes and television projections to learn about developmental biology. They created and performed their own presentations for other classes, spreading the word while developing public speaking skills, becoming teachers themselves. At the end of the week the excitement became almost explosive as they watched their baby shad hatch and swim around! Once the shad hatched, all of the participating classes gathered to released their baby shad at Great Falls National Park, near the uppermost historical spawning reach of American shad, and at Leesylvannia State Park, another historic shad spawning site. Hundreds of students arrived by bus, car and vans to carry their young shad to the banks of the Potomac River where they could begin their great journey to the sea. Parents, volunteers and interested citizens came to help and view the release. Through on-site presentations by the Interstate Commission on the Potomac River Basin and Living Classrooms staff, all assembled learned how the early Americans once fished for shad in the very area they were releasing their shad. They learned how they used the blooming shadbushes along the river as a spring harbinger of the shad's return, just as we can now do ourselves. Students hiked the river bank to see wild shadbushes and observe some of the animals that will benefit from the return of the shad, from osprey and bald eagles to rockfish and largemouth bass. They learned more about how the shad mature into adults over the next 3-6 years, swimming up and down the coast from Florida to the Bay of Fundy in Canada each year before they return to spawn the next generation. They learned about the many oceanic species, such as the cod and bottlenose dolphin, that also rely on shad, and that when we help shad we are also helping them.

Shad Program Helps Reinforce Virginia Curriculum and Standards of Learning

Shad teacher Mary Wetterhahn, a Fairfax County magnet school teacher for fifth grade, said that "The Shad program reinforced the concepts that were tested in the fifth grade Standards of Learning tests. Students felt more comfortable with the tests having completed the shad project. Living Classrooms staff presented real-life, hands-on examples of local food webs and food chains based on the ecology of the Potomac River with American shad as a featured animal. This brought home the concepts that the students were then tested on at the end of the year." Students reported retaining these concepts better and felt more confident when taking their standardized test in science. Next year we will use the feedback of teachers on the food web connection to create more shad curriculum units and improve existing lessons.

Fifth grade student's reading of *Let the River Run Silver Again!* allowed them to review a science trade book as a required part of their curriculum. Teachers at Waples Mill and Hayfield Secondary schools also helped design questions to further link the shad program to reading comprehension. All teachers report that counting shad eggs and assessing mortality mathematically, including graphing results, had a significant impact on student achievement in

later math testing. Raising the shad also nicely reinforced the content of the seventh grade curriculum in science, according to middle school science teachers Eileen Hart of South County Middle School and Amy Kraut of Hayfield Secondary School.

Waples Mill and Greenbriar West students conducted assemblies for the lower grades on the raising and releasing of their fish. Middle schools such as South County and Hayfield Secondary posted shad updates and invited the entire seventh grade to visit and view their baby shad. All of these activities improved writing and public speaking skills.

Exciting Boat Trips Show Students the Shad's Environment on the River

Thanks to the funding from the Chesapeake Bay Restoration Fund, students were able to spend a day on the river as part of the LC-NCR's shipboard experiences. On board the *Half Shell*, a restored historic Chesapeake Bay buy-boat, students tested the water quality, trawled for aquatic life including fish and plankton, observed river animals, and learned about the cultural history of the Bay. This trip was a great way to tie the entire program together with first-hand experiences on the river and bay ecosystems they just studied and helped restore. "Students have gotten a great opportunity to have such a meaningful experience" teacher Jill Meyer said of the trips. Many teachers reported that the boat trip was "one of the best field trips we have ever taken." The curriculum concepts were "further reinforced by all of the hands-on activities that we did, from sampling and observing river life to the wonderful question and answer session with the staff" said Mary Wetterhahn of Greenbriar West Elementary. Schools participating in this component were South County Secondary, Drew Model, Greenbriar West, and the VA Homeschool Association.

Innovative Restoration Practices Come Out of the Shad Program

In addition to releasing 13,800 shad into the Potomac, students also reached out to their communities about the program to raise awareness of the reasons they were restoring shad and how local citizens can help improve the water of the Potomac River for the returning fish. Students at all schools planted shad bushes whose blossoms will signal the return of shad each spring. Students learned how planting native plants on their school grounds can help reduce erosion and improve water quality. Shad bushes also provide berries to feed local wildlife. Waples Mill Elementary School in Fairfax started a native tree nursery in addition to planting their shad bushes. This nursery will be used to replant eroding areas along streams further helping water quality. Their activities were highlighted in the school newsletter and in email releases to parents (see Outreach, below).

Drew Model School reached out to their Arlington community through the county's stormwater management program. Students are painting stencils of Sherlock the Shad on neighborhood storm drains with the logo "Don't Dump" to discourage residents from using stormwater drains to discard oil and other chemicals. Students at Drew will also work with their local stream's Four Mile Run Restoration Project and are planning to do tree plantings or other activities this Fall to help improve water quality for their returning shad.

Shad Students Earn Service Hours for Shad Work

Students at Hayfield Secondary School earned service learning hours toward graduation by participating in the shad project. Caring for the shad, maintaining their tank and planting the

native shad bushes on their school's grounds to reduce erosion qualified the students. They also have the pleasure of returning to see their shad bushes bloom next spring when the shad return.

Outreach to Virginia Communities and the Region as Part of the Shad Project

Shad schools reached out to their local communities to inform them of the project and the need to restore shad. Greenbriar West students wrote letters to local press and their PTA on the shad project and then appeared in both their local newspapers and school press performing their shad work (see Attachment I - News Articles; 6/28/07 Connection Newspaper, 5/20/07 Greenbriar Flyer, a community newpaper, and the June issue of Panda-Gram, the Greenbriar West school newsletter). Parents from Greenbriar West and Waples Mill elementary schools also became involved, assisting the shad teachers with all aspects of the project, from helping to hatch the fish to setting up the boat field trips. Parent helpers also reached out to their PTA's and communities regarding the articles in the local paper and school newspapers. Student filmmakers from Bethesda Chevy Chase High School in Maryland accompanied Greenbriar students as they released shad, went on their boat trip on the Potomac and planted their shad bush to film for an upcoming student documentary on the shad project. This documentary will be submitted to the 2008 American Film Institute's Green Film Festival in Washington D.C.

New Curriculum Materials Developed

Over the summer Mrs. Wetterhahn and other shad teachers assisted shad staff member Sandy Burk in developing a new lesson on food webs/chains with American shad as the featured organism. This unit effectively matched with VA Standards of Learning but with these new lessons will increase its usefulness with the shad curriculum in 2008-9.

List of 2007 Virginia Shad Schools and Teachers

| | |
|---|---|
| South County Secondary | Four teachers: Eileen Hart, Jennifer Collins, Jeanine Carter, Erik Untiedt |
| Hayfield Secondary School | Amy Kraut |
| Waples Mill Elementary | Sean Duffy |
| Greenbriar West Elementary | Mary Wetterhahn |
| Drew Model School | Jill Meyer |

Quotes

-"Shad are amazing fish and they're worth saving." Nathan Dorr, student, Hayfield Secondary School.
-"It is so amazing how when you plant a shad bush and it starts blooming, it is a sign that you know when the shad are coming. I am so grateful that I was able to help these amazing fish grow a bigger population." - Donna Aim, student, Hayfield Secondary School

-"I am not sure who gets more excited, the students or I! I think the program is so beneficial to my curriculum too; it covers the main points of some of our units. We study populations and ecosystems and the Chesapeake Bay. The students learn about pollution and how it affects the environment and about how certain populations interact with each other. It was great to have real life, hands on work for them to study and learn from."- Amy Kraut, teacher, Hayfield Secondary School.

Be sure to see the attachments:

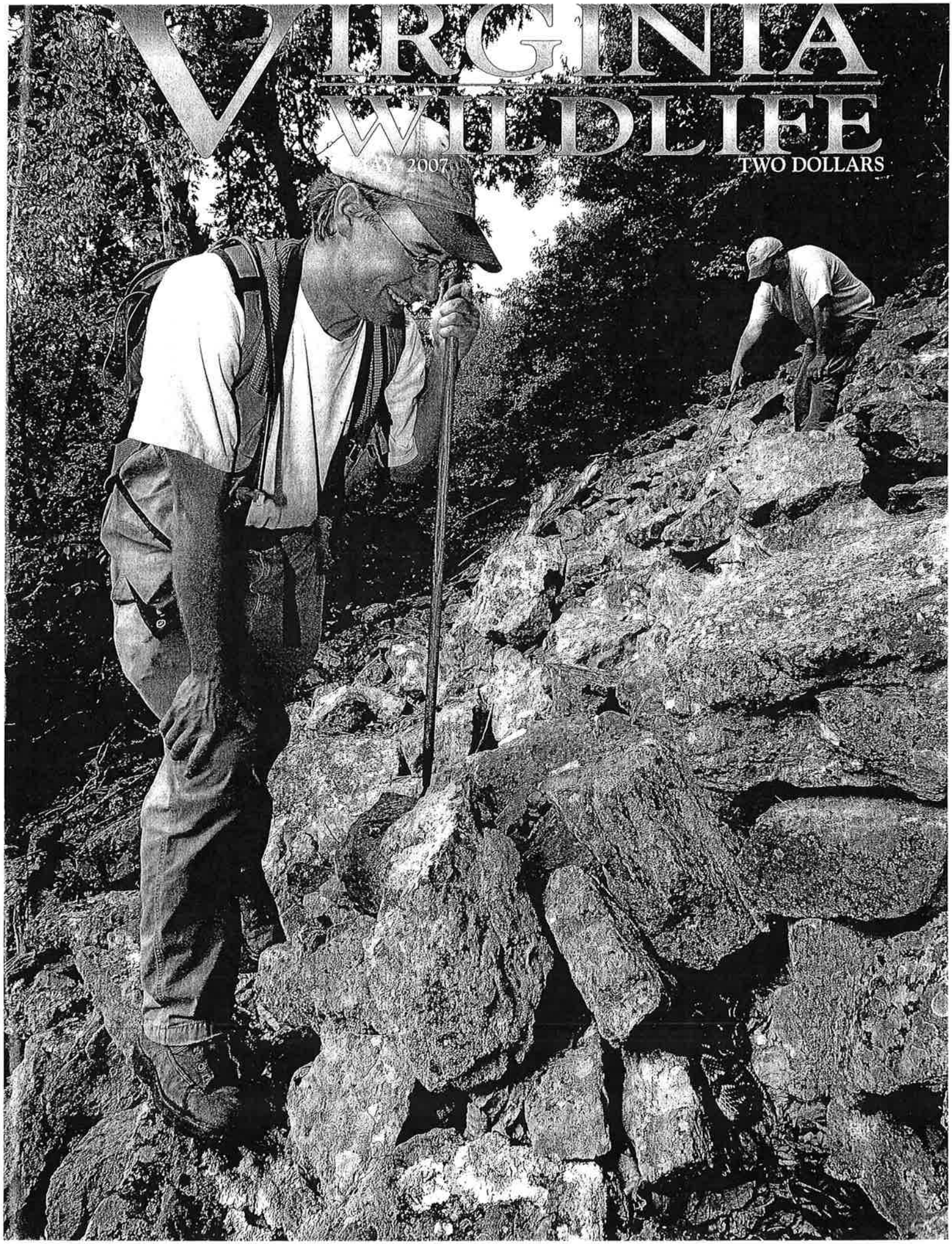
1. News Articles: A) "Potomac River Shad" by Tee Clarkson, Virginia Wildlife, May, 2007.
   B) "Students Raise, Release Shad" 6/28/07 Connection Newspaper, 5
   C) "GBW Helps Bring Back American Shad to the Potomac!" 6/20/07 Greenbriar Flyer, a community newpaper, and
   D) "Mrs Wetterhahn's 5th Grade Class helps Bring Back American Shad to the Potomac!" June Panda-Gram, the Greenbriar West school newsletter.

2. Shad Restoration Project: Evaluation 2007

But especially

3. Shad Project's 2007 Gallery of Pictures.

## Attachment I: News Articles

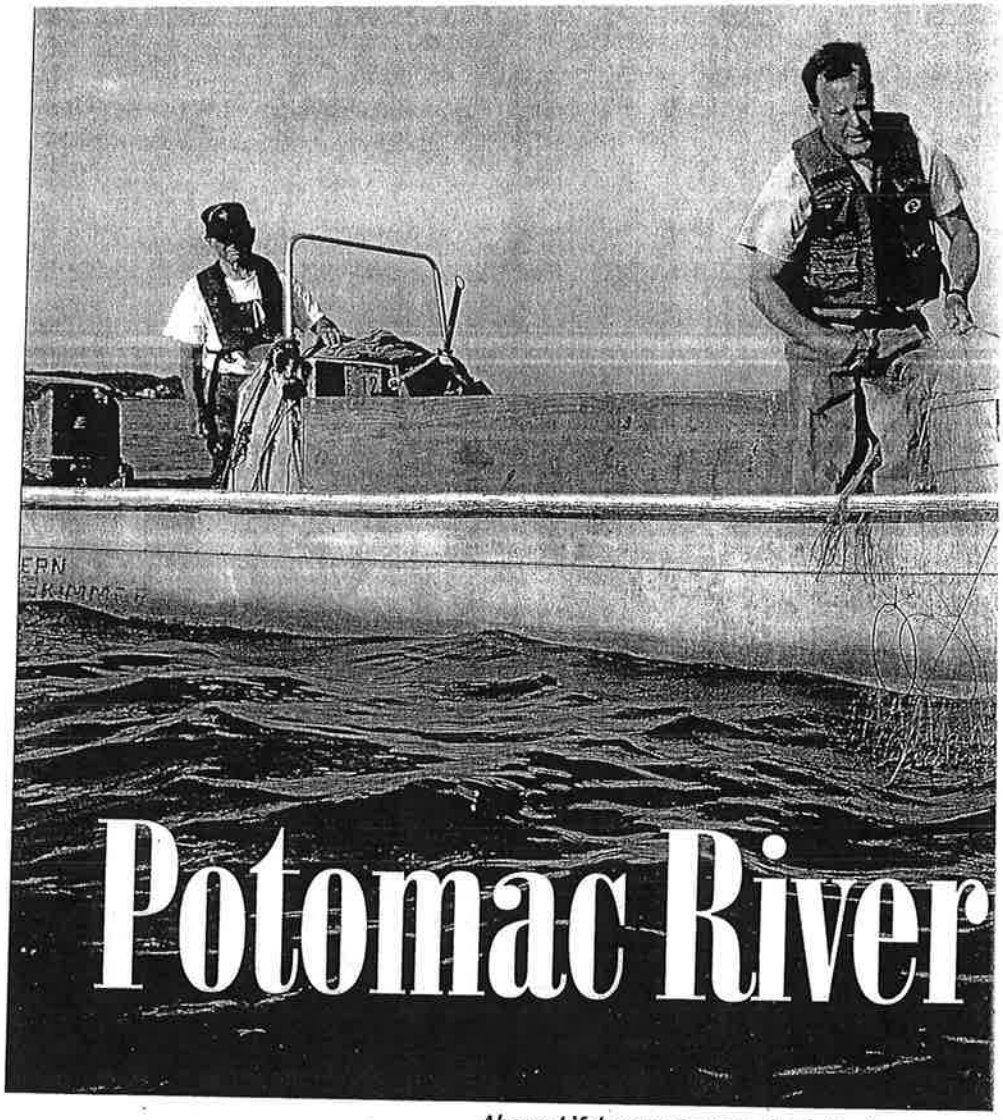

VIRGINIA
WILDLIFE
2007
TWO DOLLARS

# Potomac River

## *The Times They Are A-Changin'*

*If your time to you*
*Is worth savin'*
*Then you better start swimmin'*
*Or you'll sink like a stone*

-Bob Dylan



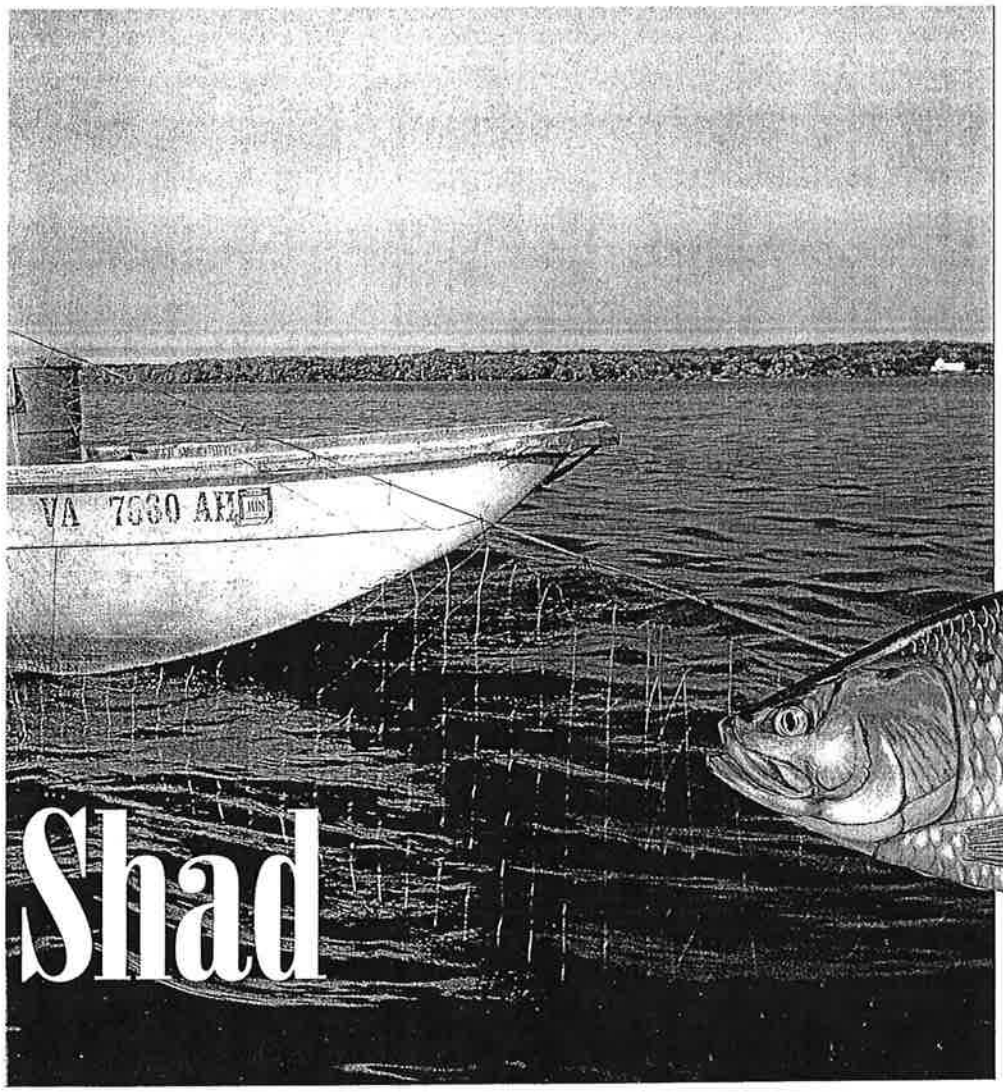
by Tee Clarkson
photos by ©Dwight Dyke

The times they are perpetually a changin'. So it stands to reason that the longer one has been around, the more a changin' they have seen. At 76 years old, Louis Harley has seen a lot of it from where he spends much of his time, the Potomac River. Louis and his son are the last full-time commercial watermen in Fairfax County, Virginia. Their family arrived in Fairfax County in 1820, most coming over from Ireland. Since then the men in the Harley family have had one job, farming the rich waters of the Potomac River.

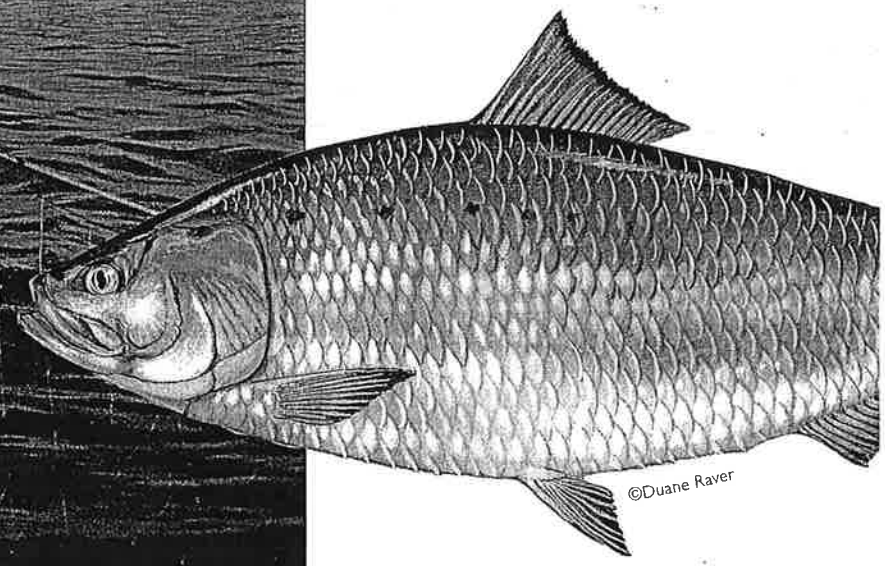
When they first began, there were plenty of families and men that scraped out a tough living from the bounties of the Potomac. Now just two men remain, Louis and his son Mike, who is 41.

"The only thing that keeps us off the water," Louis says, "is the wind and the ice. Otherwise we are out there just about every day." The father and son team have been forced to adapt their practices in order to stay afloat in an ever-decreasing market for wild fish. Now their primary business is harvesting catfish and transporting them live in trucks to stock pay lakes in Georgia and North Carolina. They also catch striped bass, white and yellow perch, and are not averse to tossing out a few crab pots when the time is right. Over the last dozen years they have added another trick to their trade, capturing American shad to help with restora-

***Above: Lifelong waterman, Louis Harley (stern) and Jim Cummins, Director of Living Resources for ICPRB (bow), net spawning American shad in floating-style gill nets that will be used as brood stock. Below: Brood stock are turned over to VDGIF fisheries biologists to conduct egg taking operations.***




# Shad




tion programs on the Potomac and Rappahannock rivers.

Anticipating a fish ladder at Brookmont Dam at Little Falls on the Potomac River, a dam that had previously prevented shad from reaching their native spawning grounds at Great Falls, The Interstate Commission on the Potomac River Basin (ICPRB), with help from the U.S. Fish and Wildlife Service and the Harrison Lake National Fish Hatchery, began a stocking program in 1995. American shad fry would be placed upstream of the dam in an attempt to restore the fish's natural spawning run. Jim Cummins, Director of Living

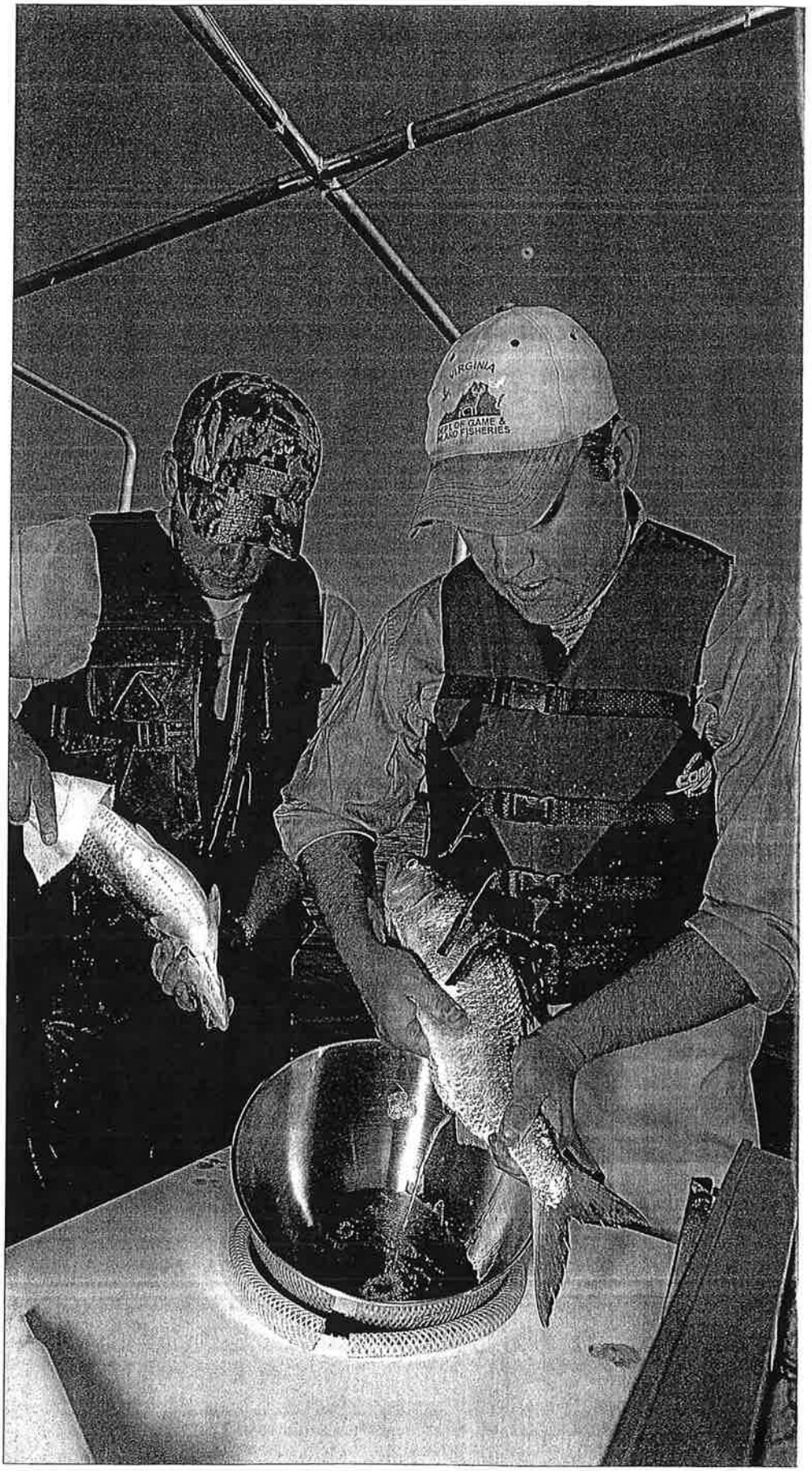
*Nets are run at dusk to dark on ebb tides. This time of day is when most of the spawning activity occurs and the slack tide is when nets are most effective.*

Resources for the ICPRB, contacted Louis and Mike to help catch the brood stock for the program.

"The first year we went out, no one knew if there were any fish left at all," says Louis. Drifting gill nets in the 40s and 50s, Louis had harvested bushels and bushels of shad aboard boats with his father, uncles and grandfather, but as time progressed the American shad population had declined so much, due to various reasons, that there was a moratorium placed on them in the 1980s. That first year working with the ICPRB, 1995,

Louis and his son went out 13 times, setting drift nets on the last several hours of the moving tide, and caught 230 fish, which accounted for 1,200,000 eggs. After biologists mix milt and eggs on the boats, the fry are then raised for several weeks in hatcheries before being released back into the river.

Louis and Mike continued working with the restoration program for the next seven years, and by 2002 the shad population had rebounded on the Potomac River. The program had




***Seventy-six-year-old Lewis Harley looks on as VDGIF fisheries biologists quickly work to hand strip both male and female American shad of sperm and eggs, where they are mixed together in collection bowls.***

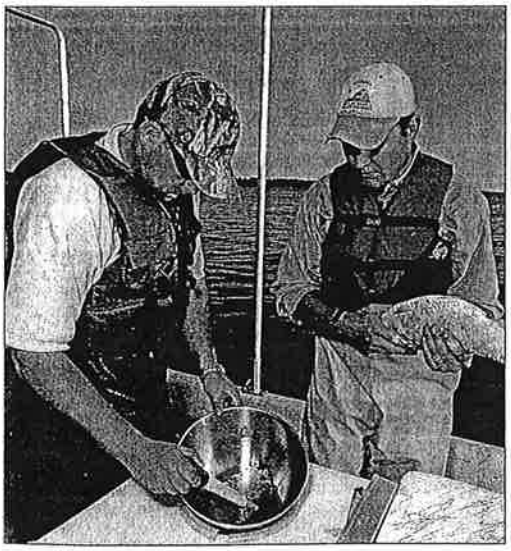
been so successful that the ICPRB partnered up with the Virginia Department of Game and Inland Fisheries (VDGIF), in an attempt to aid the struggling American shad population on the Rappahannock River. Having had success stocking American shad on the James River with a brood stock from the nearby Pamunkey, both agencies hoped to mimic the program on the Rappahannock, this time with the brood stock coming from the Potomac.

Last year it took only four hours to capture 250 American shad for brood stock purposes on the Potomac River compared to the 13 trips it had taken just 11 years ago. "That's how much it has changed," says Louis.

Tom Gunter, a district biologist for VDGIF, who spearheaded the restoration program on the James River, knew the American shad population was low on the Rappahannock. In 2002, he completed creel surveys on both the James and Rappahannock rivers at the fall lines, surveying anglers' catches. On the James, American shad ranked third in numbers caught. There was one American shad caught for every seven hickory shad. On the Rappahannock, American shad ranked last in numbers captured during the creel survey, with only one American caught for every 500 hickories. After receiving the go-ahead from genetic experts at Virginia Commonwealth University, the VDGIF and ICPRB launched the restoration program on the Rappahannock.

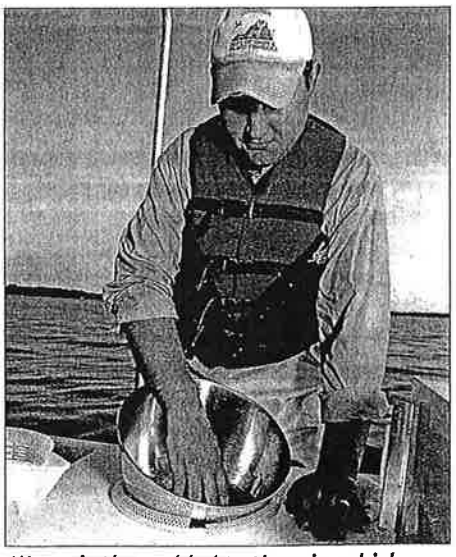
The first American shad fry were placed into the Rappahannock River in 2003. Since then approximately 14 million fry have been released. This spring the first of the fry released four years ago will have reached maturity and should return to the river to spawn. The VDGIF will complete a survey, recording the number of American shad captured in the Rappahannock this spring, to determine the effectiveness of the stocking program. Based on previous successes on the James River, Tom Gunter is hopeful that they will see similar returns on the Rappahannock.

The stocking has not just benefited the shad, it has helped school children from 22 schools in Virginia, Maryland and the District of Columbia better understand the workings of the natural world. Partnering with Living Classrooms and the Chesa-



*Top: Collection efforts are an excellent time for a quality outdoor educational experience. Above: Sperm is mixed with freshly stripped American shad eggs.*

*The sperm and eggs are mixed together in a dry state to insure the sperm is well distributed around the eggs.*



*Water is then added to the mix, which activates the sperm. The eggs will be fertilized in 30 seconds after adding water.*

peake Bay Foundation, the ICPRB has set up miniature hatcheries in classrooms and invited students, parents and teachers to aid with the American Shad Restoration Program.

"It has been the highlight of the project," says Jim Cummins. With the funding provided from the Chesapeake Bay Restoration Fund, which comes from the sales of "Save the Bay" license plates, students join the watermen and biologists on a Living Classroom boat, collecting shad and fertilizing eggs. They take eggs back to the miniature hatcheries in their classrooms, monitoring their progression using math and science skills and recording their findings in daily journals. Once the shad emerge from the eggs as fry, the students take a field trip to return the fish to the river.

"The teachers love seeing the kids get excited about the project," Jim Cummins comments. "And we like seeing the kids getting excited as well. We help inspire the kids, and they help inspire us."

The program comes to an end this year for Louis Harley after collecting one more brood stock on the Potomac. "This has been great for the river and great for the fish," he says. "It's been one of the most successful programs I have ever seen on the river, and the people that put it together should be commended."

When asked how long he plans to keep working on the river, he responds, "I will keep doing it as long as I'm in good health. An old man can only do so much."

This man, along with the Interstate Commission on the Potomac River Basin and the Virginia Department of Game and Inland Fisheries, has done a tremendous amount for the American shad populations in the Potomac and Rappahannock rivers. □

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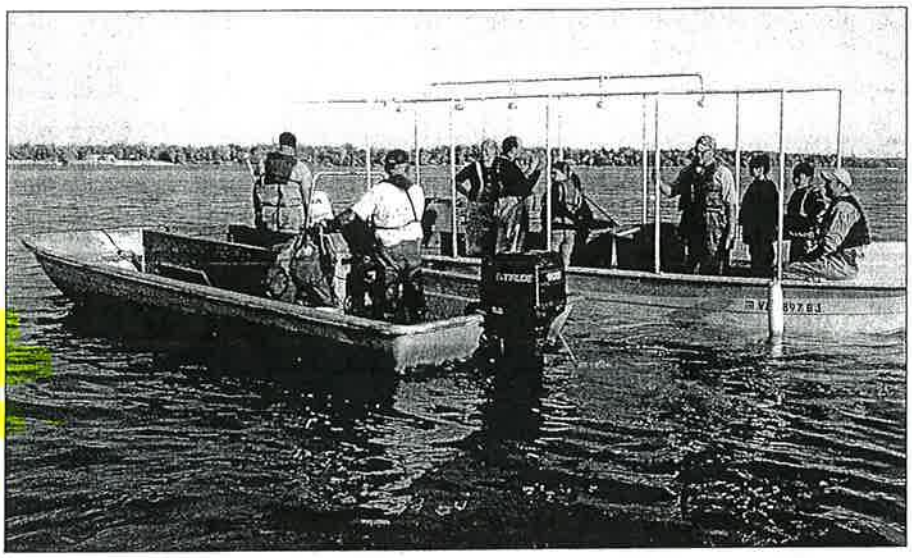
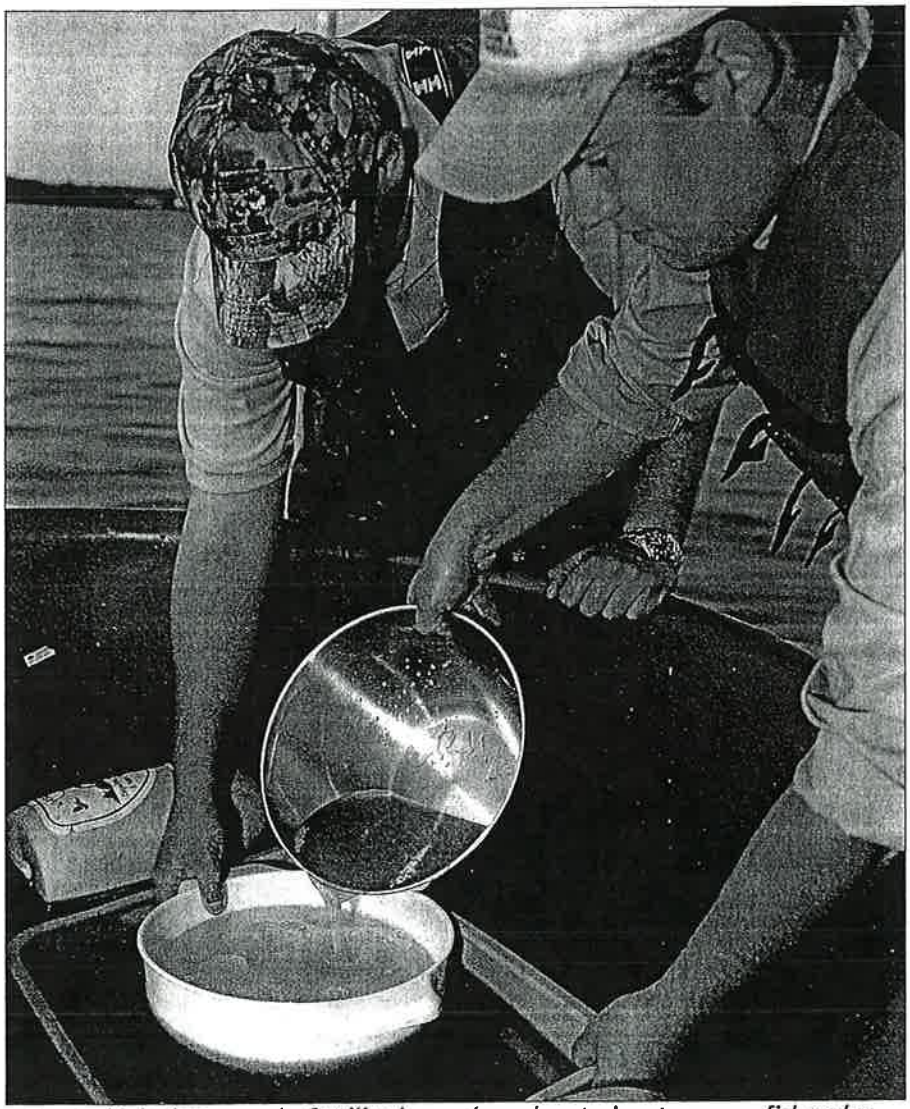
*Tee Clarkson is an English teacher and in his spare time runs Virginia Fishing Adventures, a fishing camp for kids. For more information you can contact Tee at: tsclarkson@virginiafishingadventures.com.*





***Fisheries biologists pour the fertilized eggs through a strainer to remove fish scales and other foreign matter. The eggs are collected in a water filled tub and allowed to water-harden.***

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THE CONNECTION NEWSPAPERS
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# Students Raise, Release Shad

## Greenbriar West students return fish to Potomac River.

By Bonnie Hobbs
June 28, 2007

Fifth-graders at Greenbriar West Elementary (GBW) learned firsthand that even children can play an important role in preserving the environment and the ecosystem. They were among students at 18 other schools who collected shad eggs, raised them into fish and then released them into the Potomac River.

**On Friday, May 11, the students, accompanied by many parents, siblings and grandparents, traveled to Old Angler's Inn on the Potomac River to release their young fish.**

**(Back row, from left) are GBW Principal Lori Cleveland, teacher Mary Margaret Wetterhahn, Matt Alvarez, Sandy Burk and Elaine Zarnich (Hannah's mom and Burk's sister); (front row, from left) are Niharika Dar and Hannah Zarnich.**

Printable Version

CONNECTION NEW Photo Galleries

IN FACT, for the past 12 years, students throughout the Washington, D.C., area have participated in the American Shad Restoration Project. And once returned to their spawning grounds, the fish swim more than 12,000 miles to the sea – and then come back to lay their eggs in Great Falls National Park.

Participating last month from GBW were students in teacher Mary Margaret Wetterhahn's fifth-grade GT class. And, she said, "It's one of the only conservation efforts in the country where children are saving a threatened animal."

The students caught 2,500 shad eggs off Dogue Creek near Fort Belvoir and brought them back to their classroom. They also read the award-winning book, "Let the River Run Silver Again!" by biologist/educator Sandy Burk – who visited them at GBW.

The Potomac River used to run silver with fish, and her book's name came from students who, in 1995, wrote letters to local politicians asking them to help the shad return to Great Falls.

"Shad are an important part of the ecosystem of the Potomac River and Chesapeake Bay," said Burk. "And the shad restoration program is a documented success. So far this year, students have released over 20,000 fish into the Potomac River below Great Falls, as well as into the Anacostia River."

IN VIRGINIA, this program is funded by the Virginia Chesapeake Bay Restoration Fund. And thanks partly to the student shad program, American shad are returning to the Potomac River and Great Falls in increasing numbers.

"Because of dams, pollution and overfishing, the shad fishery for the whole Chesapeake Bay was closed," said Burk. But, added Wetterhahn: "This program began in 1996, and we're now seeing levels returning to where the fishery might be able to be reopened."

While raising the fish in their classroom, her students explained why shad are important to the Chesapeake Bay's ecosystem. "Many animals who live there, including dolphins, eat them," said Niharika Dar, 10. "The bald eagles and osprey catch them," said Matt Alvarez, 11. "So if the shad population comes back, then the bald eagle and osprey population will, too, as a result."

"That's because shad are part of the food chain," said Hannah Zarnich, 11. "The shad eat plankton that hide in the grasses, and the bald eagles and dolphins eat the shad."

For three weeks prior to their catching the shad eggs, the students prepared water in a big, blue

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bucket in which they would hatch. "We put in bio-balls — plastic, spiky disks that grow healthy bacteria on them," said Matt. "And we added a liquid bacteria to help the healthy bacteria grow to help our fish survive," said Niharika.
At first, they put in too much so, said Hannah, "The ammonia level was too high." Added Matt: "It would have killed the fish, so we cleaned out the reservoir." Wetterhan said that happened because the students hadn't first bleached their container. Then they got a new pump and tried again.
"We tested the water for nitrate twice a day, plus ph, ammonia, nitrite and chlorine," said Niharika. If these elements aren't balanced, explained Hannah, "When the fish got introduced, it would kill the eggs."

PROUD OF HER students, Wetterhahn said she never had to remind them what to do; they took their duties seriously. "I have 32 GT students, and they're all bright and tenacious about this project," she said. And at the same time, they had to juggle other projects, as well as get ready for SOLs. "But they're committed and highly self-directed," said Wetterhahn. "They're problem-solving, sharing the responsibility and keeping records."
Hannah said they recorded water-quality targets; Niharika said they also kept records of the number of dead eggs "because we want to know how many we release at the end of the project. Some just die naturally and some don't get fertilized."
To check, said Matt, "We remove them with a turkey baster, put them in a Petri dish and put them in a graduated cylinder to measure how many dead eggs there are." Wetterhahn said they generally got 10 eggs per milliliter of water.
Burk expected 50 percent to survive. "In nature, one out of 1,000 go to sea to hatch," she said. "In a hatchery, that number goes up dramatically." Matt said they planned to watch the eggs and fish develop over their rapid, three-day gestation.
"We'll look for lines on the egg sac — that's the fish," he said. "We'll be able to see the spinal cord develop, and little eyes. The next day, they'll pierce the egg cells with their tails and pop out of the egg chamber into the tank of water. And the day after that, they'll be fully developed and we'll release them."
Before they reached that stage, though, said Niharika, they resembled "two eyes and a wiggle."
Burk said the students sucked up the eggs with pipettes, like eye droppers, and placed them under a microscope to see their development. Added Niharika: "Fish hatch really quickly because, if not, predators could eat them. This way, they can swim away."
Hannah was pleased that they learned how to keep the water stable for the eggs, and she was happy knowing that, by returning the shad to the river, "It brings back other creatures and increases life in the ecosystem." Matt said the experience also prepared them to take care of their own fish at home "and we can teach other kids about the shad program."

NIHARIKA said she learned lots about math and science during the project. "I also had fun setting up the tank and learning from our mistakes," she said. "It's been a really rewarding experience for me." Hannah learned about cause and effect: "If you do one thing different, it could change your whole experiment, so you have to be really careful."
Noting that her students take the sixth-grade SOLs for math, Wetterhahn said, "Keeping data tables, making predictions and problem-solving totally correlated with what they were doing in math. And it was such a real-life, learning experience."
Burk said the GBW students had "the highest rate of viable eggs" of the schools participating that week because of how well they maintained their tank. "It's probably the best batch of eggs I've seen in Fairfax County," she said. "Several thousand fish will come from this." Added school Principal Lori Cleveland: "This class has worked very hard, and it's a credit to Mrs. Wetterhahn."
Matt said the shad will go to Canada to live and, in three years, when he and his classmates are in eighth grade, they'll return to the Potomac. "They'll return to the place they were released to lay their own eggs," said Niharika. "It's their instinct to do that," said Hannah.
Delighted with the students' efforts and caring, Burk said, "This shad-conservation success story gives a message of hope. It shows how people really can make a difference in helping restore our rivers and fisheries."
For more information, see www.potomacriver.org and click on Living Resources. "Let the River Run Silver Again!" is available at www.mwpubco.com, www.amazon.com and at bookstores.

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## GBW Helps Bring Back American Shad to the Potomac!

For the past 12 years, students throughout the Washington D.C. area have participated in the American Shad Restoration Project. This project gives several local area schools the opportunity to raise American Shad fry (baby fish) in their classrooms and release them into their spawning grounds within the Potomac and Anacostia Rivers. Once released, the fish swim over 12,000 miles to the sea and then back to lay eggs at Great Falls, Virginia. This project is one of the first documented success stories where students have helped save a threatened animal.

This spring, Greenbriar West Elementary School will be participating in this very unique and exciting restoration project. Mrs. Wetterhahn's 5th grade class has been preparing for their fish-raising project for the past couple of months. Three student representatives were sent to a one-day training session to learn about the project and equipment used to raise the fish. The class has also read the book *Let the River Run Silver Again!* which documents this conservation success story since its beginning in 1995. The author, Sandy Burk, recently came to the school and spoke to the 5th graders about their upcoming project and its overall ecological importance to our community and watershed.

This month, Mrs. Wetterhahn, one student and a parent helper will join other participating schools out on the Potomac River to collect shad eggs for their classrooms. Approximately 5,000 Shad eggs will be brought back to Greenbriar West! Mrs. Wetterhahn's class is ready - they have built their fish tank (two large trashcans stacked up within a wooden frame) and test the tank water for the proper pH and ammonia levels daily. Once the Shad eggs arrive, the students will witness the eggs hatch and care for the Shad Fry for one week. The class will then travel to release their young fish at Great Falls National Park.

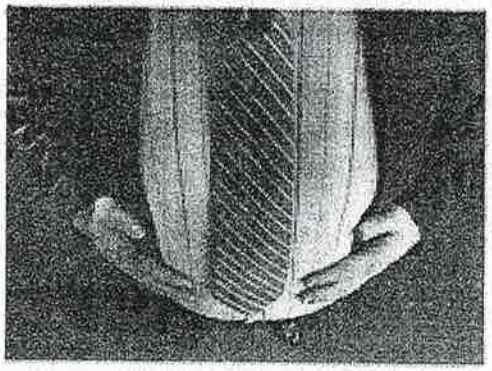
The American Shad Restoration Program is an exampl of how student-led restoration projects can help local schoo establish meaningful connections to their communitie connect kids to local culture and natural history, and promot hands-on, real-world learning experiences. This program i a partnership between the Living Classrooms of the Nationa Capital Region, Interstate Commission on the Potoma River Basin, Chesapeake Bay Foundation, and the Anacosti Watershed Society. Funding from the Chesapeake Bay Trus and the Virginia Chesapeake Bay Restoration Fun has mad this project possible.

This year marks the 12th anniversary of S.H.A.R.E. (Sha and Herring Awareness Restoration Effort). This projec which has worked with local students and scientists to restor the American Shad population in our Nation's rivers, ha resulted in thousands of American Shad being added to th spawning grounds of the Potomac and Anacostia Rivers.

S.H.A.R.E. is a partnership between the Living Classroom of the National Capital Region, Interstate Commission on th Potomac River Basin, Chesapeake Bay Foundation, Anacosti Watershed Society, and several schools from Washingtor DC, Montgomery County, Prince Georges County, Arlingto County, Fairfax County, and South County. Funding fror the Chesapeake Bay Trust and the Virginia Chesapeake Ba Restoration Fund has made this project possible.

Contact GBW to learn of the specific fish release date time and location.

Tired of the view?



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## PTA Lunch Card Update

Please note that after May 31, students will not be able to borrow from the PTA lunch card if they are short money one their personal lunch cards. This will allow the PTA the month of June to collect all money due.Therefore, we ask all students who have received a green envelope indicating they owe $2.00 to the PTA to return this money in **cash** as soon as possible. If you have questions concerning your children's account with the PTA, please contact Theresa Skopowski at **tskopow@cox.net** or (703) 378-0535.

### Artists' and Authors' Night

Artists' and Authors' Night was held Thursday, May 24. Thanks to the tireless efforts of Mrs. DeSantis and Mrs. Kocen, the GBW community was able to behold and savor the beautiful works of art and prose created by students at every grade level, displayed throughout the building. The well-crafted program directed attendees through the hallways, and described what was being exhibited. Thanks also to our teachers for making the work available for viewing. As promised by the organizers, we were amazed!

### Boxtops for Education

Thank you to everyone who sent in Boxtops for the month. The winners from our random drawing for this month are: Joey Ried, Andrew Denner and Ruhee Shah. Remember to put your name on the envelope so we know who to put in the drawing for a loot bag. Don't forget to keep clipping labels for education over the summer! Thank you!

## Mrs. Wetterhahn's 5th Grade Class Helps Bring Back American Shad to the Potomac!

Mrs. Wetterhahn's 5th grade class has been participating in the American Shad Restoration Project for the past month. This project gives several local area schools the opportunity to raise American Shad fry (baby fish) in their classrooms and release them into their spawning grounds within the Potomac River System. Once released, the fish swim over 12,000 miles to the sea and then back to lay eggs at Great Falls. This project is one of the first documented success stories where students have helped save a threatened species.

Mrs. Wetterhahn's class received 1,500 Shad eggs on May 7th. These eggs were harvested the previous evening from Shad captured and released in the Potomac River. The students prepared for 3 weeks by building their fish hatchery from two large trashcans stacked in a wooden frame and diligently caring for the tank water by testing several times a day for the proper pH and ammonia levels and applying treatments as needed. Once the Shad eggs arrived, the students were able to witness the eggs hatch, and then care for the Shad Fry for the next four days.

On Friday, May 11th, Mrs. Wetterhahn's class (accompanied by many parents, siblings and grandparents) traveled to Old Angler's Inn on the Potomac River to release their young fish. Approximately 800 Shad Fry were successfully raised and sent on their 12,000-mile journey by Mrs. Wetterhahn's class. By the time the Shad mature and return to spawn at Great Falls, the students will be in eighth grade!



From Panda-Gram School Newspaper
June 2007

## Attachment II: Shad Restoration Project 2007 Evaluations

# Shad Restoration Project: Evaluation 2007

School Name: __Greenbriar West_____
Teacher / Contact Name(s): Mary Margaret Wetterhahn
Number of total students involved in project (in all classes): 32
Grade(s): 5 G/T
Main Contact: (Circle one) X Jeanette X Sandy AWS

We ask that you take a moment to fill out this evaluation form for our staff. As you well know, critiques of the project allow our staff and partners to improve upon the program. Please circle the appropriate number below for each question. (1 is the low score and 5 is the high score)

How well did this project fit with your existing curriculum?
1 2 3 4 5

How well did staff support you through the project? (suggestions welcome)
1 2 3 4 5
Sandy and Jeanette were awesome! They were always there when I called or emailed and helped in every way possible!

How would you rate your overall Shad experience?
1 2 3 4 5
Will you do this project again next year? **Yes/ No**
Would you recommend this project to fellow teachers? **Yes/ No**
Do you currently do other projects similar to this one? **Yes/ No**
If yes, then which one(s)? CBF Grasslands
What was your favorite part of the project? All the parts were special, seeing the excitement from my students as the fish hatched.
What was your least favorite part of the project? Nothing!
What are the limiting factors for your school/ class to participate in projects like this one? Administrative support

The partners and staff thank you for your time in filling out this evaluation. It will help in our efforts for continual quality improvement to the overall project. If you have any other comments or suggestions on how we could make this a better project next year, please feel free to mention them in the space below. Thank you very much.

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You may email, fax, or mail this form to:

Jeanette Phelps
Living Classrooms-National Capital Region
P.O. Box 70437
Washington, DC 20003
Phone: 202-488-0627 x26
Fax: 202-488-1307

# Shad Restoration Project: Evaluation 2007

School Name: McLean School
Teacher / Contact Name(s): Kristin Chappell
Number of total students involved in project (in all classes): 17
Grade(s): 5 & 6
Main Contact: (Circle one) [Jeanette] Sandy AWS

We ask that you take a moment to fill out this evaluation form for our staff. As you well know, critiques of the project allow our staff and partners to improve upon the program. Please circle the appropriate number below for each question. (1 is the low score and 5 is the high score)

How well did this project fit with your existing curriculum?
1 2 3 4 [5]

How well did staff support you through the project? (suggestions welcome)
1 2 3 4 [5]
Everyone was very thoughtful in preparing their part of the training. The support staff was always quick to respond and very supportive. All in all it was easy to get up and running!

How would you rate your overall Shad experience?
1 2 3 4 [5]

Will you do this project again next year? [Yes]/ No

Would you recommend this project to fellow teachers? [Yes]/ No

Do you currently do other projects similar to this one? [Yes]/ No

If yes, then which one(s)? CBF and DNR's Bay Grasses in Classes

What was your favorite part of the project?
I love seeing the students making connections between science concepts we are learning and the real world expression of those ideas. They enjoy feeling the power of doing something productive. Quiet students who have background knowledge and experience to share are seen in a new light by their peers.

What was your least favorite part of the project? Sucking out so many dead eggs the first day, it was very time consuming.

What are the limiting factors for your school/ class to participate in projects like this one?
None. Having done it with a small group the first time, I will expand and engage all of the sixth graders next year.

# Shad Restoration Project: Evaluation 2007

School Name: **_South County Secondary School**
Teacher / Contact Name(s): **_Eileen Hart, Jen Collins, Jeanine Carter, Erik Untiedt**
Number of total students involved in project (in all classes): _____
Grade(s): **_7**
Main Contact: (Circle one) Jeanette Sandy AWS

We ask that you take a moment to fill out this evaluation form for our staff. As you well know, critiques of the project allow our staff and partners to improve upon the program. Please circle the appropriate number below for each question. (1 is the low score and 5 is the high score)

How well did this project fit with your existing curriculum?
1 2 3 4 5

How well did staff support you through the project? (suggestions welcome)
1 2 3 4 5
**Your staff was very helpful. They provided us a second tank so that we could have more students participate. They also helped us to obtain the grant to take our children on the CBF Half Shell ride. Finally it was through the cooperation of your staff that we were able to release our shad in our local watershed making a better connection for our students.**

How would you rate your overall Shad experience?
1 2 3 4 5

Will you do this project again next year? **Yes/ No**
Would you recommend this project to fellow teachers? **Yes/ No**
Do you currently do other projects similar to this one? **Yes/ No**
If yes, then which one(s)? **__All of our 7th grade students are going on a meaningful watershed educational experience at the Occoquan National Wildlife Refuge through the Prince William Conservation Alliance.**

What was your favorite part of the project? **_Watching the students get excited about the fish and learning about the shad's importance to our ecosystem.**
What was your least favorite part of the project? **_cleaning up the system!**
What are the limiting factors for your school/ class to participate in projects like this one?
**The time of the project coincides with the beginning of our SOL testing. This may be a problem for next year.**

The partners and staff thank you for your time in filling out this evaluation. It will help in our efforts for continual quality improvement to the overall project. If you have any other comments or suggestions on how we could make this a better project next year, please feel free to mention them in the space below. Thank you very much.

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You may email, fax, or mail this form to:
Jeanette Phelps
Living Classrooms-National Capital Region
P.O. Box 70437
Washington, DC 20003
Phone: 202-488-0627 x26
Fax: 202-488-1307
jphelps@livingclassroomsdc.org

**Virginia Schools Shad Project - 2007 Report**

**Attachment III: Shad Project's 2007 Gallery of Pictures**


**Figure 1: Greenbriar students on board the *Halfshell* learning about the life on and in the Chesapeake Bay and Potomac River.**

**Figure 2: South County Middle School students with teacher Eileen Hart aboard the *Halfshell*.**

**Figure 3: Greenbriar West students and teacher Mary Wetterhahn help net shad with ICPRB biologist Jim Cummins. They are filmed by a student from the Bethesda Chevy Chase High School for submission to this fall's American Film Institute's Green Film Festival.**


**Figure 4: Shad teacher Mary Wetterhahn and student Sara Alvarez with a captured American shad. Waterman Louis Harley is at the helm.**


**Figure 5: Greenbriar West teacher Mary Wetterhahn discusses shad with Fairfax County waterman Louis Harley.**


**Figure 6: Greenbriar students get ready to help strip shad eggs under the guidance of Virginia DGIF biologists and shad coordinators Dean Fowler (foreground) and Tom Gunter (background).**

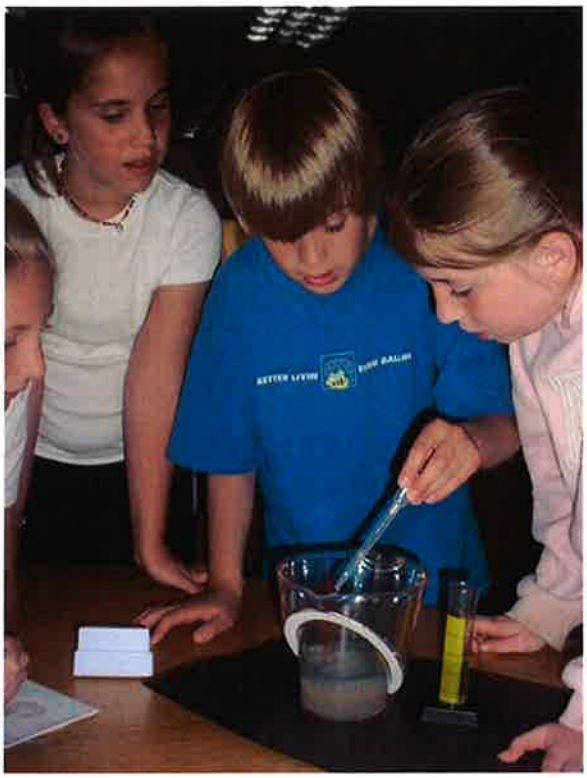

**Figure 7: Waples Mill Elementary students count a sample of shad eggs in order to estimate the total number of eggs which they received.**

**Figure 8: Greenbriar students and Living Classroom educator and author Sandy Burk (far left) measure the number of eggs in their hatching tank. The incubation jar can be seen attached to the right side of the rim of the upper tank. Personalized posters about shad are displayed in the background.**

**Figure 9: Greenbriar students monitor the chemistry of the shad hatching tanks.**

**Figure 10: A parent volunteer inspects the shad eggs before they are released into the Greenbriar shad hatching tank. The lower tank is used to filter the water.**

**Figure 11: Living Classroom educator Sandy Burk talks to Greenbriar students about their tank, the American shad, and the project.**

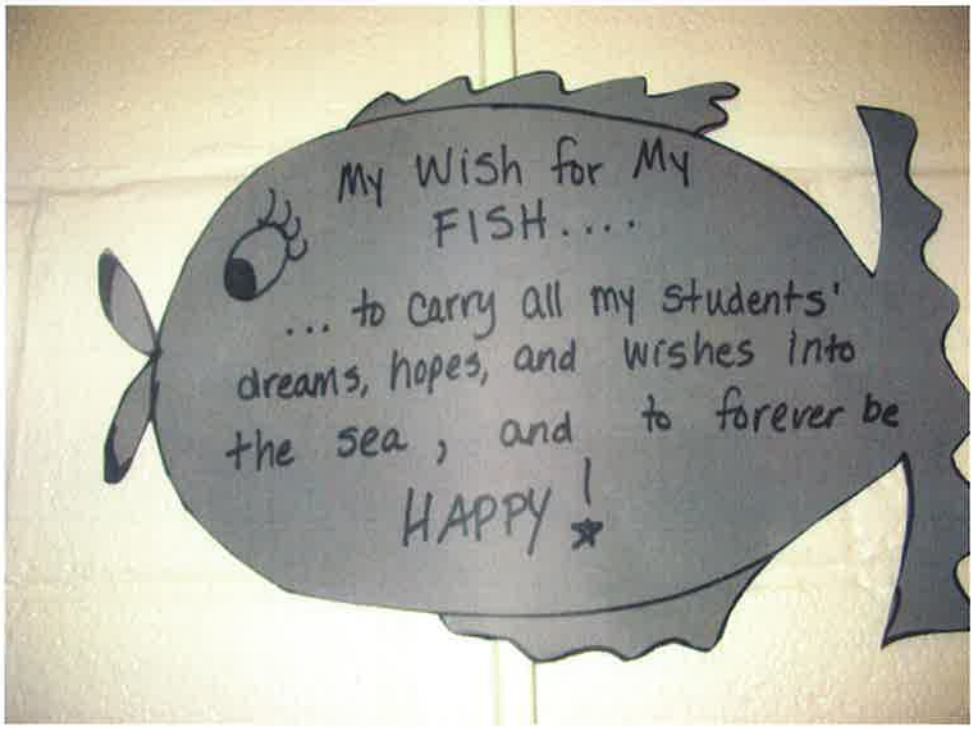


**Figure 12: A Greenbriar wish for their shad.**

**Figure 13: Greenbriar students with their planted shad bush.**

**Figure 14: Hayfield Secondary student test the shad water to make sure it has acclimated before releasing the shad at Great Falls.**

**Figure 15; Fifth graders from Greenbriar West Elementary, Fairfax County, prepare to release their shad fry downstream from Great Falls, Potomac River.**

**Figure 16: Waples Mill Elementary students release shad at Great Falls, Potomac River.**

**Figure 17: Waples Mills students contemplate the fate of their shad before they release them at Great Falls, Potomac River.**

**Figure 18: Drew Model School students and parent volunteer observe shad before their release into the Potomac River at Leesylvannia State Park.**

**Figure 19: Greenbriar students being filmed at the shad release at Great Falls.**


**Figure 20: Hayfield Secondary School students observe their shad fry in a viewer before release into the Potomac River at Leesylvania State Park.**

**Figure 21: South County Middle School students monitor the water that contains their shad fry before they release them into the Potomac River.**

**Figure 22: South County Middle School students release shad fry into the Potomac River at Leesylvania State Park.**


**Figure 23: Hayfield Secondary students release their shad into the Potomac River.**


**Figure 24: Hayfield Secondary students plant their shad bush**

**Figure 25: Bethesda Chevy Chase High School student Alex Bernstein films waterman Louis Harley, Biologist Jim Cummins, and Greenbriar West student's Matt and Sara Alverez while the group sits on Mr. Harley's porch as they get ready to collect shad.**