

# Water Quality Analysis of the Western Branch, Patuxent River



**Figure 1. Location of Iron Pot Landing's continuous monitoring station near wastewater treatment plant along the Western Branch, Patuxent River.**

By Amy Moody, *Friends of Jug Bay volunteer*

**T**he Chesapeake Bay, the largest bay in the United States, is home to over 3,600 species of animals and plants. It is important to study this area, especially the surrounding bodies of water that feed into this vital bay. The Patuxent River estuary is an integral part of the Chesapeake Bay watershed. It has an extensive network of tributaries and marshes, which act as buffers and filters for water entering the Patuxent River and eventually the Bay. These marshes and tributaries are very sensitive to changes that can occur, and anything that causes an imbalance to one system in the watershed can end up affecting the entire watershed. Parameters such as changing salinity levels, excess nutrients (eutrophication), and changes in land use around a marsh or estuary can all cause problems, including hypoxia (lack of oxygen), death of submerged aquatic vegetation, and harmful algal blooms.

The Western Branch is a tributary of the Patuxent River (Figure 1) and can impact the health of this estuary. This tributary is surrounded by a mostly urban setting; 44% of the land is developed. This has created an area surrounded by mostly impervious surfaces, increasing the amount of urban runoff. The land is also 15% agricultural,

from which excess fertilizers may drain into the tributary. Populations in this area have been expanding since the 20th century, and in the 1960s, Washington Suburban Sanitary Commission (WSSC) opened a wastewater treatment plant to accommodate the growing population. The water that goes into this plant comes from East Prince George's County and is treated then released directly into Western Branch.

A study was conducted on the Western Branch to determine the long-term water quality levels of the tributary and to better understand the trends in nutrient concentrations. The overarching question was, does the wastewater treatment plant have an impact on the Western Branch system?

To answer this question, the Western Branch was monitored at a site called Iron Pot Landing from January 2008 to December 2015. The nutrients nitrate ( $\text{NO}_3$ ), phosphate ( $\text{PO}_4$ ), and ammonium ( $\text{NH}_4$ ), along with chlorophyll (Chl-a) were analyzed for those eight years. The data was taken during a 24-hour cycle for one day each month. Additional parameters (temperature, pH, salinity, dissolved oxygen, turbidity) were analyzed to better characterize the Western Branch water quality. To make sense of the data, thresholds from the EPA and NOAA were used to determine if water quality was acceptable (Table 1).

*Continued on page 2*



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[www.jugbay.org](http://www.jugbay.org)

Jug Bay Wetlands Sanctuary is operated by the Anne Arundel County Department of Recreation and Parks. It was established in 1985 with the goals of wetlands research, environmental education, and protection. The Sanctuary is a limited-use park. Groups are requested to make a reservation by calling the office before planning a visit.

Jug Bay Wetlands Sanctuary is a component of the Maryland Chesapeake Bay National Estuarine Research Reserve, which along with 27 other Reserves around the country promotes scientific research, public education, resource management and stewardship in estuaries across the nation.

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Comments and suggestions are welcome.

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*Water Quality Analysis, continued from page 1*

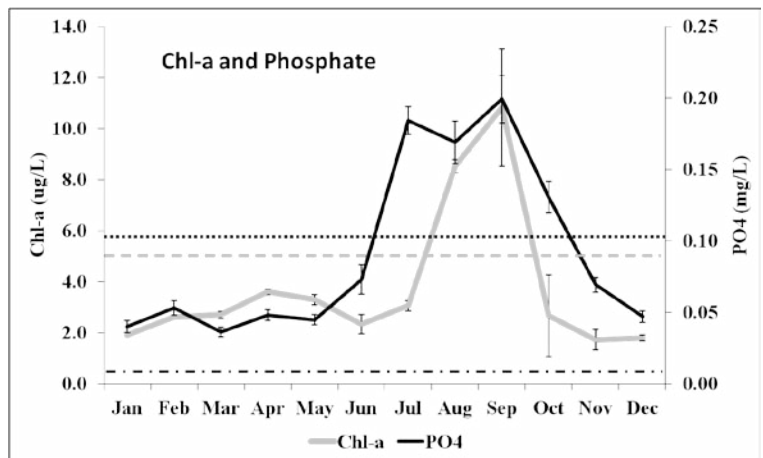
	Low Threshold	Medium Threshold	High Threshold
Ammonium (NH <sub>4</sub> )			1.9 mg/L
Nitrate (NO <sub>3</sub> )		0.1 mg/L	1.0 mg/L
Phosphate (PO <sub>4</sub> )		0.01 mg/L	0.1 mg/L
Chlorophyll-a (Chl-a)	5 ug/L	20 ug/L	60 ug/L
Dissolved Oxygen (DO)		2 mg/L	5 mg/L
Turbidity		15 NTU	

**Table 1. Threshold levels for the main parameters that were observed in the Western Branch, Patuxent River.**

Nutrient and chlorophyll levels below the thresholds indicate that eutrophication levels are low, and therefore the system can support and sustain life. Salinity needed to be in or around freshwater levels for this area to be healthy. Dissolved oxygen had to be above the threshold of 5 mg/L to be considered an area that can support life without putting the aquatic organisms at risk. Turbidity is the level of clarity in the water column, and high levels are caused by suspended particles in the water column. High levels can block light and can even cause organisms to die by smothering.

During the eight-year study period, NH<sub>4</sub> concentrations mostly remained below the 1.9 mg/L threshold value. Only one spike was seen, and this was most likely due to a snowstorm that occurred that year. Particularly high PO<sub>4</sub> values were observed during summer and fall, the pattern of which seems to match that of Chl-a (Figure 2). Chlorophyll is a good measure of the amount of phytoplankton in a system, and after an increase in PO<sub>4</sub>, there was an increase in Chl-a. This was probably due to typical seasonal patterns; however, PO<sub>4</sub> was above the threshold value for most of the eight years. A significant decreasing trend in NO<sub>3</sub> and dissolved inorganic nitrogen (DIN) was observed, with NO<sub>3</sub> reaching an average of 0.25 mg/L by 2015—just above the medium eutrophication value of 0.1 mg/L (Figure 3). In 2011, the wastewater treatment plant started upgrading to using enhanced nutrient removal (ENR) techniques, which most likely explains this trend. PO<sub>4</sub> also indicated a decreasing trend, but it was not as significant (Figure 4). ENR does not focus on PO<sub>4</sub>, and therefore even though a decrease was seen, the main focus of the wastewater treatment plant is on removing nitrates. Higher values for NO<sub>3</sub> occurred during late fall, winter, and early spring. Some of the high NO<sub>3</sub> concentrations from November 2008 to December 2009 may have been the result of wastewater treatment plant outflows; specifically September 2008 (15,396 gal), December 2008 (20 gal), and January 2009 (1588 gal). There was also a hurricane in September 2009 (Hanna), which may have contributed to some of the higher levels through watershed runoff. Dissolved oxygen (DO) values were above threshold limits, indicating healthy conditions for aquatic life. There was no sign of hypoxia or distress from lack of oxygen in the system, which was indicated by the presence of fish and submerged aquatic vegetation. Similar results were obtained for pH, temperature, and salinity. Turbidity levels were overall above the 15 NTU limit. Submerged aquatic

**Figure 2. Chlorophyll seems to follow the same seasonality as phosphate, both parameters showing higher levels during summer and fall.**



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## Dear Friends,

What makes Jug Bay Wetlands Sanctuary special? I would venture a guess that each of us could offer many different reasons. As I was pondering this question, I realized my answer has changed over time. As a scientist, I am always trying to rationalize the world around me, so I am drawn to any endeavor that adds to our understanding of our existence. But in the early 1970s, Jug Bay was important to others and to me because it was a pristine site under threat of development. My initial reaction was to see its potential development as the first domino in the commercialization of a beautiful rural area—my backyard. Was I a NIMBY? Perhaps!

But I was reminded recently that my initial focus on the special quality of Jug Bay was really influenced by the growing environmental awareness of the 1960s. I recently watched the PBS Special on Rachel Carson, and I remembered with a flood of emotion the ethos arising then. It was a time of the awakening to the importance of the environment by the general public. Civil rights were front and center, and science offered solutions to any problem. Travel to the moon occupied our psyche and seemed to prove that science could solve anything. But there was Rachel Carson telling us to be careful. Although science could be a lifesaver, it also could bring about unintended consequences. In addition to Carson, there were people like Paul Ehrlich who postulated that population growth would reach the Malthusian limit, and Donna and Dennis Meadows who saw limits of the planet's resources. Carson's warning about DDT pointed to the limits of science. DDT developed in WWII was considered a lifesaver. Not only did it save troops from the ravages of malaria, it subsequently was used worldwide to rid entire regions of insect-borne diseases. But Carson was nagged by scientific reports, done at our nearby Patuxent Research Refuge, that indicated there was a dark side to DDT that was detrimental to wild- and aquatic life. On the other hand, science seemed to disprove Ehrlich's impending over-population crisis. The so-called "green revolution" caused the unit production of food to increase many-fold. However, the dark side of this revolution is just now emerging. Genetically modified organism crops can be sprayed with pesticides that eliminate the competition of weeds, thereby allowing the crop to increase. Science can't stop evolution though; it can only understand it. The weeds have responded by evolving herbicide resistance. Thus farmers now require more and different pesticides in the race against the evolution of weeds.

We have not yet arrived at the environmental limits predicted by the Meadows. In the 1970s, the empirical evidence pointed to middle of the current century, when we would begin to find it too costly to extract key energy and ore resources. Again science and technology are giving us the impression that these resources are plentiful. Is this a false impression? Are we just consuming them faster? Time will tell! The common thread among these examples I have cited is that technological advances have positive and negative effects. It is the unintended negative effects that are worrisome.

In the 1960s we were also becoming aware of wetlands. They were often referred to as the "kidneys of the planet." Since then we have learned what they actually do for us. They provide a list of innumerable ecosystem services including improving water quality by retaining toxics and transforming nutrients, controlling floods and stormwater, sequestering carbon, stabilizing sediments, and providing aquatic and wildlife diversity. Our own water quality measurements at Jug Bay confirm that our high-quality wetlands remove 50% of the nutrients during the diurnal ebb and flood of the tides. According to Walter Boynton, these amazing wetlands in the Patuxent watershed remove 48% of nitrogen inputs to the upper estuary even though they constitute only 1.5% of the basin landscape.

So it was in this milieu that the concept of Jug Bay Wetlands Sanctuary evolved. The Sanctuary owes its existence to those who had the prescience to see the future need for functioning wetlands as a critical natural resource. And, perhaps more importantly, the tradition of research and education that was fostered then continues today. This year the memberships of The Friends of Jug Bay represent nearly 1,000 people. The Friends continue their sponsorship of summer research and education interns. Unfortunately, we have lost count, but a good guess would be over 70 interns! We continue to support transportation for schools needing support; we now see more demand than we have resources to fund. Our membership is diverse. About half of our members reside outside of Anne Arundel County, and some even continue their memberships from distant places.

So I think the answer to my original question is that Jug Bay is special because it is more than a place. Jug Bay captures a spirit. It is the community of folks that make it special. We are just its current stewards in a long line of people. The archaeological evidence shows that Jug Bay was a bountiful center for Native Americans centuries ago. I like to think that we need to foster the ethos that established Jug Bay Wetlands Sanctuary and hand it off to the next generation in a condition that is as good as it was when we received it. Now I can say I am an "IMBY," and I am glad to have the Sanctuary "In My Back Yard."

Al Tucker, *President, Friends of Jug Bay*

### We welcome new and returning FOJB members:

<i>Steve and Betty Arthur</i>	<i>Scott Gates</i>
<i>Karen Bailey</i>	<i>Peter Guttmacher</i>
<i>Robin Brownstein</i>	<i>Devin Hochhausler</i>
<i>Torbjorn Bjerknæs</i>	<i>Cynthia Jurkone</i>
<i>Shannon Borges</i>	<i>Daniel Koenig</i>
<i>Rya Burruss</i>	<i>Enrique Lozano</i>
<i>Charlie Candon</i>	<i>Jane Lyle</i>
<i>John Caughey</i>	<i>Pat Martra</i>
<i>Jim Collatz</i>	<i>Mary McHugh</i>
<i>Curtis Cusey</i>	<i>Peter Moreno</i>
<i>Karen Czamowski</i>	<i>Charlene Morgan</i>
<i>Lee Darrow</i>	<i>Elizabeth Oswald</i>
<i>Monica Denison</i>	<i>Sandra Ravin</i>
<i>Claire DeSoi</i>	<i>Stephen Sheridan</i>
<i>Lynn Fowler</i>	<i>Maurice Tome</i>
<i>Darren and Margit Fox</i>	<i>Elizabeth Urbanas</i>
<i>Greshen Gaines</i>	<i>Paul Vanderveen</i>
<i>Lisa and Gerald Galuardi</i>	<i>Herb Wolff</i>

## Classrooms in the Field Program

# Jug Bay Welcomes Students with Special Needs

By Liana Vitali, *JBWS Education Coordinator*

On an unusually warm and pleasant November day last year, Kevin and I watched four students arrive at the Sanctuary and amble down our brick path towards the Wetlands Center, lunch boxes swinging at their hips. On this day, we welcomed our first fully special needs class to Jug Bay Wetlands Sanctuary for a Classrooms in the Field trip.

“Actually, we don’t refer to them as ‘special needs students,’” Ms. Manders kindly corrected me. “These are our students with special needs. They are students first, not defined by their abilities first.”

While it may seem a small shift in parlance, changing the order of the words can wholly pivot the perception of a person. A “child with autism,” at least to me, translates differently in my mind compared to an “autistic child.” After our experience today though, it won’t be a distinction I’ll soon forget.

And so, with this welcomed clarification in mind, Timothy, Jenna, Gabby, and Sage, their teachers, and Kevin and I set out to explore what the Sanctuary was willing to share with us that day, armed with a veritable arsenal of discovery tools.

Our first stop was the infamous Jug Bay overlook. I invited the students to place their hands on the railings, close their eyes, and use their remaining senses to experience the world around them. I couldn’t help but peek at them while they stood, so trustingly, with their eyes closed. I watched Gabby tilt her head gently to the left where wind had rustled the leaves of a nearby oak tree. Timothy, who is known to shake his arms up and down nearly uncontrollably when excited, was running the palms of his hands along the railing, feeling the last of the morning dew splash between his fingers. Jenna was positively flourishing with her eyes closed, taking the deepest, most wholesome breaths I think I’ve ever seen a child take. Sage was



**Sage, Gabby, Jenna, and Timothy enjoying their time outdoors. Photo by Emily Manders.**

peeking. I could see her, and I tried not to laugh as I watched her lift her eyebrows sky high to allow just a sliver of light and sight into her eyes.

I asked the students to open their eyes and share, if they wanted to, what they each experienced. Gabby’s hand shot skyward. “I heard the wind!” Jenna pointed vigorously out to the marsh, verbalizing in her own way what she smelled. I asked Timothy if he wanted to share but he remained silent. Ms. Manders, always primed with a helpful prompt, asked, “Were you feeling the water on the railing?” Timothy smiled and said yes but then looked immediately in my direction to ask a very serious question.

“Ms. Liana, when is your birthday?” The slightly puzzled look on my face must have been obvious to Ms. Manders, who again came to my aid. “Timothy, do you want to share your special skill?” “Yes!” he exclaimed. So, I shared my birthday.

“Your birthday is June 26,” he pondered. “This year, June 26 was a Sunday. Last year, it was a Friday. In 2010, it was a Saturday!” Seeing him swell with joy at sharing his gift, I decided to give him a challenge.

“OK Timothy, what day of the week did my birthday fall on when I was born... in 1983?” He paused briefly, seemingly working through the algorithm he has deftly created in his mind. “That... was... a

Sunday!” A quick check of the handy iPhone confirmed his answer. Amazing.

And so our day continued, with the Sanctuary providing its gifts to the students while the students shared their gifts with us. Gabby was extremely knowledgeable about animals and explained to me all about box turtles. Timothy, whose arms thrashed almost violently with excitement over a wood frog, gently and sweetly held our littlest goat, Pax, in his arms all while taking deep, calming breaths. I watched Sage bravely step outside her comfort zone to touch bumpy frogs and slimy earthworms, and even taste wild onion, but not without discharging the herb with a dramatic, spitting flourish afterwards. And Jenna, who can’t exactly verbalize in words, was the greatest interpreter of us all. By thrusting handfuls of spicebush leaves into Ms. Manders hands and pulling her classmates hands down to a mossy pile of gametophytes to feel the soft and feathery leaves, she intimately connected each of us with the natural world.

I can only hope the day was half as fulfilling for Gabby, Timothy, Sage, and Jenna as it was for us. But I having a feeling it was, since Ms. Manders just submitted her field trip request for this May.

And, like Timothy, I’m fighting the urge to flap my arms up and down with excitement at their return.

# Goodbye to Heather

By Judy Burke, *JBWS Office Manager*

The good news was that Sanctuary naturalist Heather Baden delivered a healthy, beautiful, baby girl last fall. The bad news (for us) is that a few months later, she decided not to return from maternity leave, focusing instead on her family. Colleagues and volunteer friends gathered at a potluck lunch in January to wish her well.

Heather joined the Sanctuary staff in November 2012, but her family roots and her experience as a local naturalist go much deeper. In 2006, she began working part time at Patuxent River Park across the river. Then she joined the research team at the Chesapeake Bay National Estuarine Research Reserve, which strengthened her connections with the Anne Arundel side of Jug Bay.

“I had the pleasure of getting to know the Sanctuary staff and programs through [those] jobs,” Heather recalls. “I was attracted to the balance of research and education. I began working a couple months before Chris Swarth retired. My first days were spent collecting memories, publications, and photos of [his] many years at the Sanctuary. This gave me an insight to the values and accomplishments of the Sanctuary,” and to the crucial contributions of its longtime volunteers.

Heather’s skills covered a wide range. Her preschool nature programs—“Where does a spider live? What does it eat?”—enchanted toddlers, and her ability to find animals while leading a Classroom in the Field impressed a colleague: “She always knows where to look.”

Elaine Friebele, our former education coordinator, says Heather “had a love for the natural history of the area, and she conveyed that to the children. She was a really good educator and really good at designing materials to use with the kids...at all levels. She could relate to high schoolers and preschoolers.”

Heather says she will return someday to environmental education, but for now, “I am choosing to simplify my life. Though I will deeply miss exploring the outdoors with students, it is a blessing to be able to explore every day with my children.”

**Heather shows preschoolers a box turtle. Photographer unknown.**



## Jug Bay’s 2016 Accomplishments

### JBWS Certified Green Center until 2020

#### GOAL: Protected Habitats



**Prescribed grazing:**  
125 m<sup>2</sup> meadow treated



**Habitat management:**  
68 bags of trash removed  
75 bags invasive plants removed  
35 trees of heaven cut



#### GOAL: Science

**Mentoring:**  
12 High school students  
2 Research interns  
2 Data analysis students

**NEW Mammal monitoring:**  
Small mammals  
Deer spotlighting  
Coyote calls

#### GOAL: People



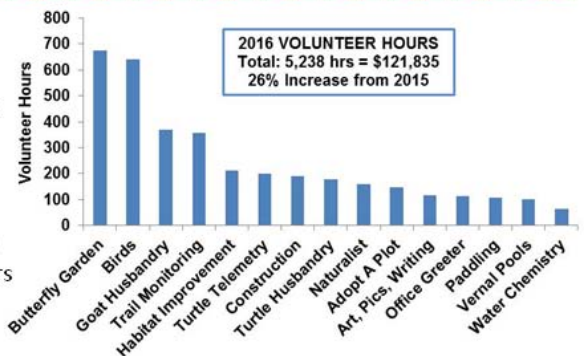
135 programs delivered  
2,614 total participants  
8,305 contact hours



1,123 students reached  
4,909 Classroom in the Field (CITF) contact hours



1,491 public program participants



**Patuxent River Conference**  
110 participants from 30 organizations

**VISITORS**  
Total: 26,000 (20% Sanctuary Proper)  
Other states: TX, WA, KY, FL, CA  
Countries: U.S., England, Bangladesh

### WHAT'S NEW IN EDUCATION



American Indian Plant Exploration



Special Needs Programs

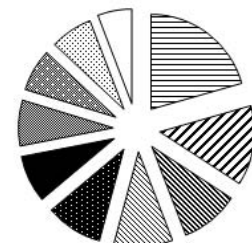


Bilingual Programs



Expansion to Glendening Preserve

**\$26K Grants**



- Lothian
- ▨ Dunkirk
- ▩ Edgewater
- ▧ Crofton
- ▦ Upper Marlboro
- Arlington - VA
- ▤ Bowie
- ▣ Annapolis
- Severna Park
- Churchton

**Check out what we accomplished in 2016! Thank you to all the staff, volunteers, partners, and friends who made it possible.**

# PUBLIC PROGRAMS AT JUG BAY

## Open Hours:

**Sanctuary Wetlands Center:** Wednesdays, Fridays, Saturdays, and (starting March 1) Sundays 9:00 am - 5:00 pm

**Glendening Nature Preserve:** Wrighton Road entrance daily, gate open 9:00 am - 5:00 pm; Plummer House entrance Monday to Saturday, gate open 9:00 am - 5:00 pm (trails, Butterfly Garden, dogs on leash)

**Patuxent Wetland Park:** daily, dawn to dusk (fishing, hand-carried boat launch)

**Wootons Landing Wetland Park:** daily, dawn to dusk (fishing, loop trail, hand-carried boat launch)

Sanctuary Wetlands Center admission fee: \$6/vehicle

Free for current Friends of Jug Bay members, active volunteers, and the military.

There are no fees to visit our other sites.

Visit [www.jugbay.org](http://www.jugbay.org) for directions, information and updates to our schedule.

Registration is required for all programs. Please call 410-741-9330 or e-mail [programs@jugbay.org](mailto:programs@jugbay.org) to register, or, in the case of ActiveNet programs, register online at <https://apm.activecommunities.com/aarecparks>. All programs meet at the Wetlands Center at 1361 Wrighton Road unless otherwise noted. An adult must accompany children under 13.

## Guided Bird Walks

**First Saturday of every month,**

**8:00 am - 11:00 am**

**Ages: 12 and older**

**Fee: \$6/vehicle entrance fee**

Learn the skills of identifying birds by sight and sound. Binoculars and field guides are available to borrow. Wear comfortable walking shoes and dress for the weather. **Registration required:** Call 410-741-9330 or e-mail [programs@jugbay.org](mailto:programs@jugbay.org).

## Soup and Science Lecture Series

**Sunday, March 12, 12:00 pm - 3:00 pm**

**Ages: 16 and older**

**Fee: \$6/vehicle entrance fee**

Enjoy hearty homemade soup and fresh bread

with fellow nature lovers. Then sit back with dessert and enjoy listening to our guest speaker, Liana Vitali, the Sanctuary's Education Coordinator. She will discuss her summer research at the Vermilion Sea Institute in Baja California, Mexico, using spot pattern-recognition software developed for space exploration to study whale sharks.

Register online at [www.friendsofjugbay.org](http://www.friendsofjugbay.org).



photo by Nick Lasacone

## Awesome Ospreys!

**Saturday, March 18, 10:30 am - 12:00 pm**

**Ages: All**

**Fee: Free for FOJB members, \$5 per person or maximum \$10 per family for nonmembers, payable to Friends of Jug Bay**

March is the time when ospreys return to their nests at Jug Bay. Come learn about these majestic creatures, and then join us on the Observation Deck to view them with our spotting scope. **Registration required:** Call 410-741-9330 or e-mail [programs@jugbay.org](mailto:programs@jugbay.org).

## Spring Equinox Hike

**Saturday, March 18, 5:00 pm - 7:30 pm**

**Ages: 8 and older**

**Fee: \$5 per person/maximum \$15 per family** Join Master Naturalist Mike Quinlan for a leisurely hike through the Sanctuary to see and hear the signs of spring. Wear shoes that can get wet and muddy, just in case. Binoculars and cameras are always a good idea. We'll end by watching the sunset from the Observation Deck. **Registration required:** Call 410-741-9330 or e-mail [programs@jugbay.org](mailto:programs@jugbay.org).



## Jug Bay Summer Camps!

### Where the WILD Things Are Nature Camp

**Monday, July 17 through Friday July 21, 9:30 am - 3:30 pm; Ages: 10-12**

**Fee: \$175/child for Friends of Jug Bay Members (Active Net Activity #10671), \$200/child for nonmembers (Active Net Activity #10672)**

Catch frogs, build a fort, seine for fish, walk in a stream, paddle a canoe, and squish your toes in the marsh! Enjoy a week of outdoor summer fun along the Patuxent River at Jug Bay Wetlands Sanctuary. Campers will discover new animals and habitats every day through nature exploration, crafts, and games. Scholarships available; contact Liana Vitali at 410-741-9330 or [rpvita23@aaccounty.org](mailto:rpvita23@aaccounty.org).

### Into the WILD Nature Camp

**Monday, July 31 - Friday August 4, 9:30 am - 3:30 pm; Ages: 13-15**

**Fee: \$175/child for Friends of Jug Bay Members (Active Net Activity #10666), \$200/child for nonmembers (Active Net Activity #10670)**

This isn't your normal summer nature camp! Campers will get hands on with the WILD world by paddling the river, wading through the marsh, exploring an archaeological site, and trying on wildlife research skills. Campers will also put their map reading and compass use to the test to discover secrets of the Sanctuary. Scholarships available; contact Liana Vitali at 410-741-9330 or [rpvita23@aaccounty.org](mailto:rpvita23@aaccounty.org).

# PUBLIC PROGRAMS AT JUG BAY

## Tai Chi by the River

Sunday, April 2, 10:30 am - 12:00 pm

Ages: 8 and older

Fee: \$6/vehicle entrance fee

Calm spirit, alert mind, strong body: Tai chi offers a wealth of benefits, especially when practiced in a natural setting. Join us for an introduction to this meditative martial art. We will meet on the Observation Deck overlooking the Patuxent. [Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.](mailto:programs@jugbay.org)

## Project FROGWATCH Training

Saturday, April 8, 7:30 pm - 9:30 pm

Ages: All

Fee: Free

Learn to identify our local frogs and toads by their calls and appearance. Time in the field for practice. Choose a site near your home to participate in this Citizen Science project. Bring flashlights. [Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.](mailto:programs@jugbay.org)



## Spring Break in the Park

Wednesday, April 12, 9:30 am - 3:30 pm

Ages: 8-12

Fee: \$30/child (ActiveNet Activity #10249)

Spend a day of Spring Break exploring Jug Bay Wetlands Sanctuary with leaders Jen Muro and Diane Goebes! Participants will hike the woods, dip net in a vernal pool, search for wildlife, pull invasive plants, and make a nature craft. Bring a

bag lunch and a pair of waterproof boots or footwear that can get wet. Dress for outdoor exploration! [Registration is required through ActiveNet.](mailto:programs@jugbay.org)

## Science Art Studio

Thursday, April 13, 9:00 am - 5:00 pm

Ages: 10-13 (grades 5-8)

Fee: \$40/child (ActiveNet Activity #10248)

Field sketching, macrophotography by phone, and solar printing are just some of the techniques children will learn during our Spring Break Science Art Studio. Hosted by local artists and inspired by the natural sanctuary surroundings, children learn about the different ways art can be used to express science and get to work creating! The fee covers all art supplies including a sketchbook and mini macrophotography lens for cell phones kit that children will keep. The day will culminate with a mini exhibition for family and friends of the children's favorite creations. Everyone will have an opportunity to put their work on exhibit in the sanctuary visitor center for the month following the series. [Registration is required through ActiveNet.](mailto:programs@jugbay.org)

## Riggleman Jug Bay Farm Hike

Saturday, April 15, 1:30 pm - 4:30 pm

Ages: All

Fee: \$6/vehicle entrance fee

Come get acquainted with a future part of the Sanctuary: the Riggleman Jug Bay Farm. We'll hike through the forest and along the stony shore known as "Axhead Beach" for its Native American artifacts. Wear shoes that can get muddy. We'll meet at the Wetlands Center and drive to the site in caravan. [Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.](mailto:programs@jugbay.org)

## Explore Mosses

Saturday, April 22, 2:00 pm - 4:00 pm

Ages: 8 and older

Fee: \$6/vehicle entrance fee

Tiny but tenacious, mosses are miraculous in their ability to colonize and thrive in a wide variety of habitats. Come learn about the diversity

of mosses at the Jug Bay Wetlands Sanctuary. We'll have a short talk to introduce you to mosses and then head outside and examine some of the native mosses with a hand lens.

[Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.](mailto:programs@jugbay.org)



## Amazing Amphibians

Sunday, April 23, 1:00 pm - 3:00 pm

Ages: Families

Fee: \$10 for first abode, \$5 per additional abodes (vehicle entrance fee included)

Join a volunteer Sanctuary naturalist to learn all about frogs and toads. We'll share some amazing facts, learn about life cycles, and visit with live animals. Bring amphibians into your yard by making and taking a toad abode of your own! All materials provided. [Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.](mailto:programs@jugbay.org) Your reservation will be secured when payment is received. Checks should be made payable to Friends of Jug Bay.

## Eat the Weeds

Saturday, May 6, 9:30 am - 1:30 pm

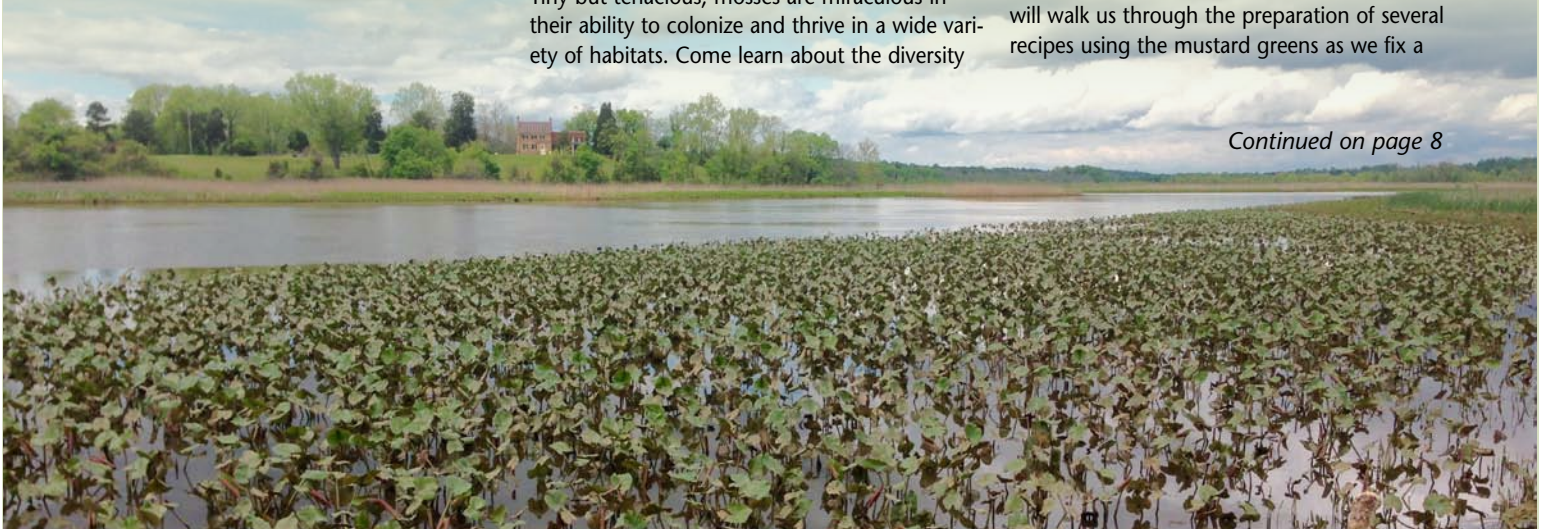
Ages: 21 and older

Fee: \$8/person (payable to FOJB)

Seeking hungry foragers to help our forest and butterflies. We'll learn about the impacts of the non-native invasive garlic mustard plant then pull it from the woods at the Glendingen Nature Preserve. At the Wetlands Center, Chef Anne will walk us through the preparation of several recipes using the mustard greens as we fix a



*Continued on page 8*



gourmet lunch. Wear shoes and clothes that can get dirty, and bring work gloves. Meets at Plummer House, 5702 Plummer Lane, Lothian, 20711. Registration required: Call 410-741-9330 or e-mail programs@jugbay.org to check availability. Your reservation will be secured when payment is received. Checks should be made payable to Friends of Jug Bay. [Registration form can be downloaded at http://www.jugbay.org/education.](http://www.jugbay.org/education)

### Fantastic (Mini)Beasts & Where To Find Them!

**Saturday, May 6, 1:00 pm - 3:00 pm; Ages: 5-8**

**Fee: \$10/child (ActiveNet Activity #10340)**

There is a universe of mini-beasts underfoot at Jug Bay Wetlands Sanctuary! Armed with handheld magnifying glasses and portable microscopes, we will spend the afternoon exploring the beasts of the vernal pools, river, and streams and those creatures building worlds beneath fallen logs. Wear shoes for hiking and come prepared for the weather as this event is rain or shine. [Registration is required through ActiveNet.](#)

### Herps of Jug Bay

**Sunday, May 7, 1:00 pm - 3:00 pm; Ages: 10 and older**

**Fee: \$6/vehicle entrance fee**

We'll spend a spring afternoon in the field observing and learning about the diverse reptile and amphibian population of the Sanctuary. Cameras and binoculars recommended. For families, not professionals. [Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.](#)

### Shepherd Property Hike

**Friday, May 12, 9:00 am - 11:00 am; Ages: All**

**Fee: \$6/vehicle entrance fee**

Join Park Ranger Adam Smith in a rare chance to explore the Shepherd property, part of Jug Bay Wetlands Sanctuary that has limited access. Our prey will include amphibians, birds, flowers—and the elusive fairy shrimp! We will meet at the Wetlands Center and carpool. [Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.](#)

### Women on the Water

**Saturday, May 20, 9:30 am - 3:00 pm; Ages: 21 and older**

**Fee: \$30 for FOJB members, \$35 for nonmembers, payable to the Friends of Jug Bay**

Tap into the serenity of our wetlands with a leisurely canoe trip on the Patuxent River. We'll look for wildlife and wetland plants along the Patuxent and Western Branch. We will enjoy a gourmet lunch. The day will conclude with a guided relaxation session. Please bring a yoga mat or towel. Fee includes naturalist canoe guides, all canoe equipment, guided relaxation session, lunch, and park admission. A hike/walk in the woods will be substituted if weather conditions do not allow for canoeing. Bring water, sunscreen, sun hat, sunglasses, shoes that can get wet, and an extra set of dry clothes. No experience necessary. Prompt program start time. [Registration is required: Call 410-741-9330 or e-mail programs@jugbay.org to check availability.](#)

### Marsh Ecology by Canoe

**Saturday, May 27, 10:00 am - 2:00 pm; Ages: 7 and older**

**Fee: \$20 (ActiveNet Activity #10251)**

Discover the abundant wildlife in the Patuxent River wetlands. We'll paddle up some of the smaller branches of the river to look for beavers, birds, and flowering wetland plants. Please arrive 15 minutes before the start time. Bring plenty of water, sunscreen, sun hat, sunglasses, a lunch, and shoes that can get wet. [Registration is required through ActiveNet.](#)



## Jug Bay Volunteer Opportunities Moving Online!

Starting in spring 2017, the Jug Bay website will be the main source of specific details on Jug Bay's myriad volunteer opportunities. Visit <http://www.jugbay.org/volunteer> to learn about our volunteer programs and [http://www.jugbay.org/volunteer\\_calendar](http://www.jugbay.org/volunteer_calendar) to see dates, times, and descriptions for volunteer programs with fixed schedules.

This change will allow for more timely updates to volunteer programs than the quarterly *Marsh Notes* can provide. It will also give *Marsh Notes* a little more space to celebrate more of the seasonal accomplishments of the Jug Bay community!

*Marsh Notes* will still continue to showcase new volunteer programs, report on volunteer accomplishments, and promote special opportunities in the Volunteer News section.

Have questions about volunteer programs or joining our volunteer team? **Call 410-741-9330 or e-mail Volunteer & Stewardship Coordinator Melinda Fegler at [rpfeGL00@aacounty.org](mailto:rpfeGL00@aacounty.org).**

### Winter Volunteers:

- |                     |                    |                     |
|---------------------|--------------------|---------------------|
| Cal Baier-Anderson  | Darcy Herman       | Tom Petska          |
| Tere Barañano       | Nick Iacone        | Bob Plunkett        |
| Marty Barron        | Ella Igwe          | Jan Prigelmler      |
| Woody Barron        | Regina Kregger     | Mike Quinlan        |
| Mike Blackstone     | Jack Krusburg      | Dom Raino           |
| Susan Blackstone    | Dave Larrabee      | Tim Reichard        |
| Tanya Booth         | Lloyd Lewis        | Cyndi Reynolds      |
| Cynthia Bravo       | David Linthicum    | Gordon Reynolds     |
| Susan Brockman      | Alec Loudermilk    | Barbara Ricciardi   |
| Peggy Brosnan       | Andrea Loudermilk  | Jennifer Rooks      |
| Gordon Burton       | Cliff Loudermilk   | Rick Rooks          |
| Mary Burton         | Clara Mankowski    | Doris Schmitz       |
| Danny Bystrak       | Joe Mankowski      | Anna Schollenberger |
| Caroline Camero     | Madeline Mankowski | Mary Kay Sistik     |
| Karen Caruso        | Barb Mann          | Joan Slettvet       |
| Alan Christian      | Brad Mann          | Bob Smith           |
| Regan Christian     | Chuck McClain      | David Smith         |
| Rebecca Christopher | Rob McEachern      | Linda Smith         |
| Michelle Cole       | Pat Melville       | Chris Taylor        |
| Mike Cunningham     | Edward Miller      | Kathleen Turk       |
| David Davis         | Amanda Mink        | Pete Uimonen        |
| Damara Dayton       | Angela Mitchell    | Sue Waddington      |
| Victoria De Tolla   | Karen Moe          | Anna Watson         |
| De Tolla Family     | Amy Moody          | Peter West          |
| Cathryn Dippo       | Kelly Moorehead    | Suzanne White       |
| Margie Dowsett      | Dave Mozurkewich   | Bob Williams        |
| Kim Elliott         | Anne Muecke        | Sea Williams        |
| Erin Engstrom       | Manfred Muecke     | Sue Williams        |
| Kirsten Enzinger    | Matthew Muir       | Dave Williamson     |
| Detolla Family      | Dotty Mumford      | Kris Wood           |
| Gramlich Family     | Jennifer Muro      |                     |
| Lind Family         | John Norris        |                     |
| Lee Fisher          | James Notaro       |                     |
| Elaine Friebele     | Jim Oland          |                     |
| Noëlli Garcia       | Carolyn O'Reilly   |                     |
| Madeline Gardiner   | Matthew Payne      |                     |
| Joyce Gillespie     | Siobhan Percey     |                     |
| Diane Goebes        | Dave Perry         |                     |
| Ernie Goins         | Beth Petenbrink    |                     |
| Zeke Gonzales       | Meghan Petenbrink  |                     |
| Edwin Granados      |                    |                     |
| Sharon Griffing     |                    |                     |
| Julie Haimes        |                    |                     |
| Jim Harle           |                    |                     |
| Lauren Hartman      |                    |                     |
| Bev Hatcher         |                    |                     |
| Chuck Hatcher       |                    |                     |
| Yasmine Hentati     |                    |                     |

During the winter, volunteers logged 215 hours. A contribution worth over \$22,154!

*Thank You!*

### Winter Donations

- Bird seed from **Karen Caruso**
- Field identification books and Rite in the Rain journals from **Mike Quinlan**



# Project OWLNET at Jug Bay a Success

By Mike Quinlan

Project OWLNET ([www.projectowl.net](http://www.projectowl.net)) came to the Mid-Atlantic region in 1994, started by Dave Brinker, a biologist with the Maryland Department of Natural Resources. Its primary focus is on learning more about the movements and biology of Northern Saw-whet Owls (*Aegolius acadicus*).

The Saw-whet is one of the smallest North American owls and is found in forested habitats throughout southern Canada and the northern United States. Many move southward in the winter, both to find food and to escape severe weather.

In the fall of 1995, volunteer and Master Bander Danny Bystrak decided to try Saw-whet banding at the Sanctuary. That turned out to be an “irruption” year: a year with a large movement of the owls south from their breeding grounds and normal winter ranges.

The technique for capturing Saw-whets includes the use of standard mist nets in conjunction with an audio lure, playing the call of an owl. Studies had revealed this as an effective technique compared to passive netting. Nets were set up along the Farm Trail and operated on several nights from mid-October to early December of 1995. That resulted in the banding of a surprising 35 owls. You never know what’s out there until you look!

Based on that success, we ran nets at different locations on the River Farm, with varying intensity, from 1996 to 2003. During the 1999 season, another irruption year, we banded 55 owls. That season also produced our first foreign retraps, birds banded at the Sanctuary and recaptured elsewhere. However, the intervening years produced poor results (see table). It appears that the Patuxent River corridor is not a significant migration pathway for the owls. The time involved in checking nets and processing owls placed a high demand on the volunteers with minimal results. Therefore, we decided to suspend operations.

Never ready to give up easily, we did test various net locations at the Glendening Preserve a few nights between 2003 and 2012.



Northern Saw-whet Owl (*Aegolius acadicus*). Photo by Mike Quinlan.

Conditions for the banders were much better, but we didn’t know if the owls would cooperate. Results were promising based on that limited effort.

By 2016, the number of Saw-whet banding stations across Canada and the U.S. had increased exponentially, and more was known about migration patterns and timing. Early in the fall, the experts postulated another big year. Therefore, we decided to conduct an intensive but concentrated effort at the Preserve—a good decision. Although 2016 did not turn out to be as big a year as predicted, it was very good. In five nights of operation, including three all-nighters, we banded 19 owls. We also recaptured an owl banded in eastern Pennsylvania earlier in the season. Many visitors had the chance to see these diminutive raptors for the first time, which is always a great experience.

Success breeds success. We’ll be back next year for a similar effort, but there is no guarantee of similar results. Stay tuned.

## Total new Saw-whet Owl bandings per year at Jug Bay Wetlands Sanctuary.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2007	2010	2011	2012	2016	Total
Bandings	35	1	8	3	45	4	12	19	7	3	3	1	4	19	162





Jug Bay is one of the three components in the Chesapeake Bay National Estuarine Research Reserve, Maryland. The purpose of CB-NERR is to manage protected estuarine areas as natural field laboratories and to develop a coordinated program of research and education as part of a national program administered by National Oceanic and Atmospheric Administration (NOAA).

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Check out the  
CBNERR-MD web page at  
[www.dnr.state.md.us/bay/cbnerr](http://www.dnr.state.md.us/bay/cbnerr)

# Monitoring Barn Owls in Monie Bay Component of the Reserve



**Barn Owl (*Tyto alba*) captured at Monie Bay, MD. Photo by Marion Clement.**

By Chris Snow, CBNERR Stewardship Coordinator

The Monie Bay component of the Chesapeake Bay National Estuarine Research Reserve (CBNERR) is the oldest component of the Reserve, dedicated in 1985. The site is dominated by several thousand acres of tidal salt marsh. Great owl habitat might not be the first thing that comes to mind when you see the expansive, treeless landscape. But with a little help, Barn Owls (*Tyto alba*) can find a place in this productive habitat. For almost two decades, the Maryland Department of Natural Resources (MD-DNR) has placed large boxes in the marsh to provide nesting sites for these secretive birds.

Barn Owls are a cosmopolitan species found on every continent except Antarctica. Here in Maryland, we are fortunate enough

to have them as year-round residents. A medium-sized owl, they stand about 15 inches tall with a 3-foot wingspan. They favor open fields and thin woodlands like the marshes of Somerset County, which provide excellent hunting grounds. They are also cavity nesters, preferring to build their nests in large, partially hollow trees. Tress with these characteristics generally tend to be in limited supply in the marsh areas around Monie Bay. We provide these nest boxes to help supplement natural nesting sites, giving local Barn Owls a place to call home.

The Barn Owl Box Monitoring Project is being carried out by CBNERR in cooperation with the MD-DNR Wildlife and Heritage Division to place and monitor the nest boxes. Through the project, we replaced all the boxes previously placed by MD-DNR, and we added some new locations, resulting in a total of 13 boxes in

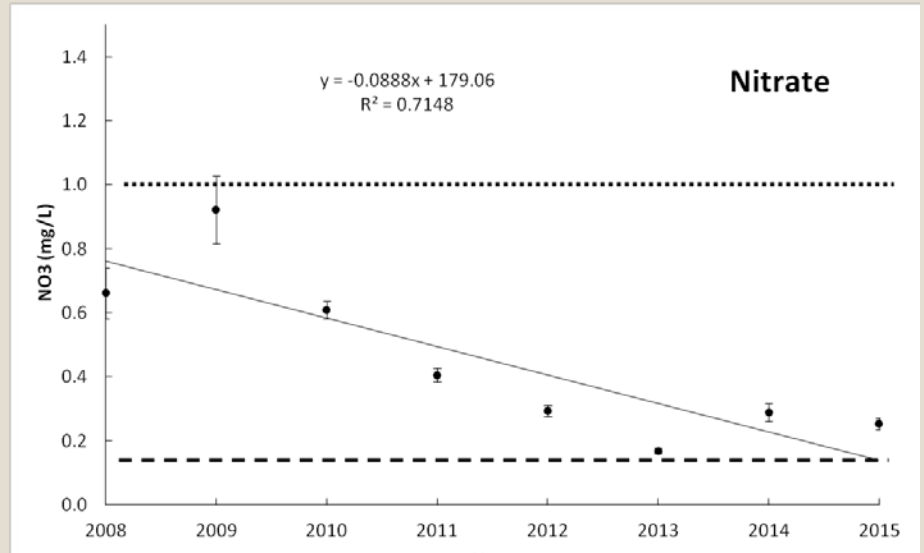


**Barn Owl nest box installed in Deal Island Wildlife Management Area. Photo by Chris Snow.**

the Deal Island Wildlife Management Area. We also monitor nest fate and productivity and have revived a program to band the young owls before they fledge (i.e., are able to fly). Banding helps us understand how these birds disperse from their natal grounds. Monitoring how many young survive to fledge gives us a sense for how well the marsh supports a healthy owl population. If numbers drop, it could be a sign of declining prey availability or even a decrease in marsh quality.

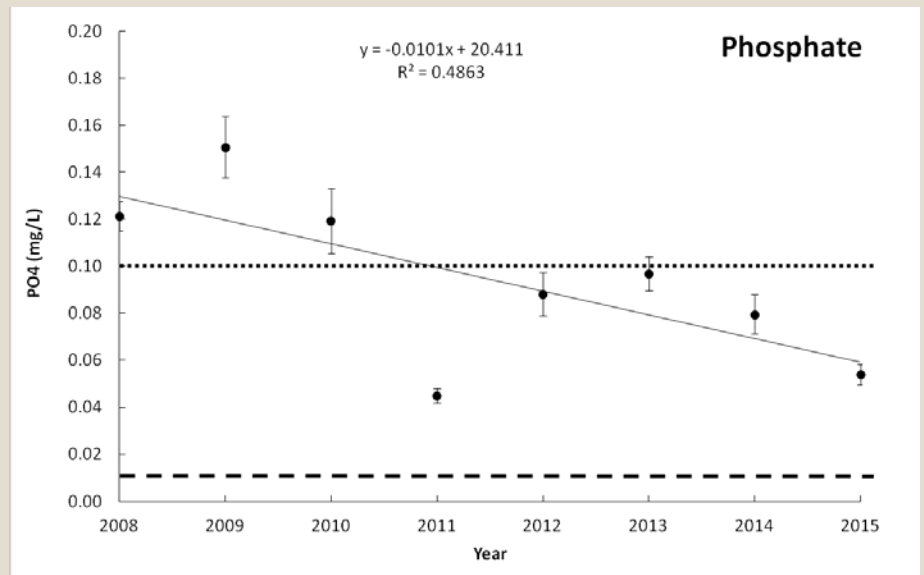
Between May and November, we banded or recaptured 34 owls, making 2016 a very good year. We even recaptured adults in the boxes that were banded as juveniles in Pennsylvania and Calvert County. It seems people aren't the only ones moving to the Eastern Shore for the good life! Barn Owl populations have significantly decreased in Maryland and other eastern states. This could be due to habitat lost for nesting and hunting and possibly rodent control, which affects prey availability. The population in Monie Bay appears to be fairly stable, but we will continue to monitor Barn Owls to ensure they stick around for years to come.

**Water Quality Analysis, continued from page 2**



**Figure 3.  $R^2$  indicates a significant decreasing trend of nitrate concentrations. The same trend was observed for dissolved inorganic nitrogen.**

vegetation and fish are present in this system suggesting fair/good conditions. Similar results were observed for other parameters such as salinity. It was not normal to go above the thresholds for salinity, turbidity, and pH. Going above the thresholds was usually caused by a storm event.



**Figure 4. The regression indicates a decreasing trend of phosphate concentrations.**

The decreasing levels of both nitrate and phosphate seem to relate to the wastewater treatment plant's implementation of ENR. As more of the treatment plant's ENR became operational, the nutrient levels continued to decrease. While this is great news, more still needs to be done to improve water quality. Solutions need to be thought of to reduce plant outflows during storm events, such as expanding the capacity of water the plant can process. The plant also needs to focus on removing  $PO_4$  from wastewater, which would hopefully reduce the seasonal spikes seen in the water column. If the seasonal spikes become too high at some point, phytoplankton levels could increase, limiting the amount of oxygen in the system. Non-point sources of pollution, such as urban and agricultural runoff, need to be controlled to help prevent spikes in nutrients. Overall, the Western Branch is a healthy system and will hopefully continue to be so in the future.



DEPARTMENT OF RECREATION AND PARKS

**Jug Bay Wetlands Sanctuary**  
**1361 Wrighton Road**  
**Lothian, MD 20711**  
**410-741-9330**



# SPRING 2017

## SAVE THE DATE

### *Native Plant Sale* at the Glendening Nature Preserve

*Saturday, June 3 and Sunday, June 4, 10:00 am - 3:00 pm*

The volunteers of the Butterfly Garden will offer hundreds of native plants for sale to raise money for the Friends of Jug Bay. There will be native trees, shrubs, grasses, and flowers for sale, as well as plants for birds, butterflies, and bees.

