

Initial Results from Deer Exclosure Research Project

Is Deer Management Helping the Recovery of Jug Bay's Forest Understory?

By Patricia Delgado, *Director, Jug Bay Wetlands Sanctuary*

The problem of White-Tailed Deer (*Odocoileus virginianus*) overpopulation and what it means to Jug Bay and Maryland forests unfortunately does not need introduction. Over the long term, deer browsing of young plants (seedlings and saplings) of forest shrubs and trees may result in a loss of species diversity, a shift in tree species dominance, and forest degradation. To address this problem and in an effort to restore and protect Anne Arundel County public forests, a deer management program was approved in 2008 by the County and implemented at Jug Bay in 2009. Since then, an average of 27 deer per year have been taken from our Glendening Nature Preserve, the Sanctuary Proper, and River Farm properties combined.

After seven years of deer management one would hope that some positive response could be observed in the forest understory, such as an increase in the numbers of tree seedlings and saplings. So, we asked ourselves: *Is this indeed what is happening?* Data collected since 2009 from 10 10-m² deer exclosures and from the same number and size of control plots (i.e., 10 deer-accessible forest plots of the same size) since 2014 provide some preliminary insights.

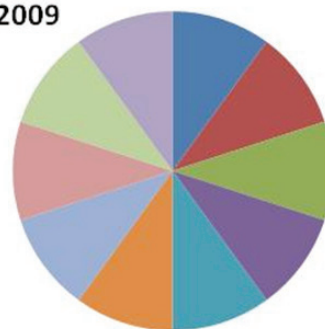
1. Overall, species diversity doubled from 2009 (when deer management started) to 2016 for both deer-excluded plots and deer-accessible plots (Figure 1).

2. Overall, the total number of seedlings found in deer-accessible plots was significantly larger than that of deer-excluded plots (Figure 2).

3. The number of species that reached seedling densities equal or greater than 5 per 10-m² plot was larger in deer-excluded plots (Figure 3).

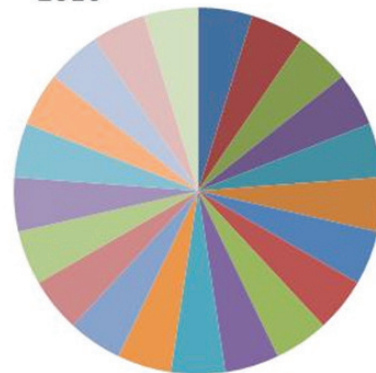


2009



- *Carya tomentosa*
- *Cornus florida*
- *Fagus grandifolia*
- *Lindera benzoin*
- *Liquidambar styraciflua*
- *Liriodendron tulipifera*
- *Quercus spp.*
- *Sassafras albidum*
- *Vaccinium spp.*
- *Viburnum dentatum*

2016



- *Acer rubrum*
- *Amelanchier canadensis*
- *Asimina triloba*
- *Carpinus caroliniana*
- *Carya tomentosa*
- *Cornus florida*
- *Diospyros virginiana*
- *Fagus grandifolia*
- *Ilex opaca*
- *Ilex verticillata*
- *Lindera benzoin*
- *Liquidambar styraciflua*
- *Liriodendron tulipifera*
- *Pinus virginiana*
- *Prunus serotina*
- *Quercus phellos*
- *Quercus spp.*
- *Sassafras albidum*
- *Vaccinium sp.*
- *Viburnum acerifolium*
- *Viburnum dentatum*

Fig. 1. Change in species diversity from 2009 to 2016 for three of the monitoring plots for both deer-accessible and deer-excluded plots.



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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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Continued from page 1

Deer Accessible	Deer Excluded
<i>Asimina triloba</i> (Paw Paw)	<i>Lindera benzoin</i> (Spicebush)
<i>Viburnum acerifolium</i> (Maple-leaved Viburnum)	<i>Amelanchier canadensis</i> (Serviceberry)
<i>Carpinus caroliniana</i> (American Hornbeam)	<i>Quercus</i> spp. (Oaks)
<i>Carya tomentosa</i> (Mockernut Hickory)	<i>Viburnum acerifolium</i> (Maple-leaved Viburnum)
<i>Lindera benzoin</i> (Spicebush)	<i>Viburnum dentatum</i> (Southern Arrow-wood)
	<i>Vaccinium</i> sp. (Blueberry)
	<i>Ilex verticillata</i> (Winterberry)
	<i>Sassafras albidum</i> (Sassafras)
	<i>Pinus virginiana</i> (Virginia Pine)

4. In both deer-accessible and deer-excluded plots, seedlings are growing into the sapling stage (see table above). (Saplings were considered those plants that reached 50 cm or higher in height.) However, over the years, a higher number of saplings was observed in the deer-excluded plots compared with the deer-accessible plots.

5. Regarding the growing of seedlings into the sapling stage, these are four main points we have learned from the data so far (Figure 4):

a. Out of 21 tree species recorded, 7 species were only found in the seedling stage in all years and in all plots (deer accessible and deer excluded): *Acer rubrum*, (Red Maple), *Carya tomentosa*, *Diospyros virginiana* (Common Persimmon), *Liriodendron tulipifera* (Tulip Tree), *Prunus serotina* (Black Cherry), *Quercus phellos* (Willow Oak), and *Viburnum acerifolium*.

b. Twelve species grew into the sapling stage in the deer-excluded plots: *Amelanchier canadensis*, *Carpinus caroliniana*, *Cornus florida* (Dogwood), *Fagus grandifolia* (American Beech), *Ilex verticillata*, *Lindera benzoin*, *Liquidambar styraciflua* (Sweet Gum), *Pinus virginiana*, *Quercus* spp., *Sassafras albidum*, *Vaccinium* spp., and *Viburnum dentatum*.

c. Only six species grew into the sapling stage in the deer-accessible plots: *Asimina triloba*, *Ilex opaca* (American Holly), *Lindera benzoin*, *Liquidambar styraciflua*, *Sassafras albidum*, and *Vaccinium* sp.

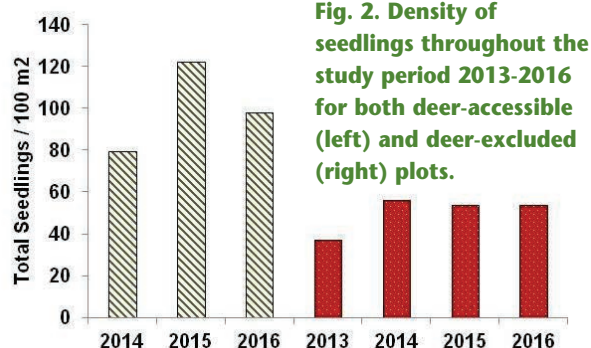


Fig. 2. Density of seedlings throughout the study period 2013-2016 for both deer-accessible (left) and deer-excluded (right) plots.

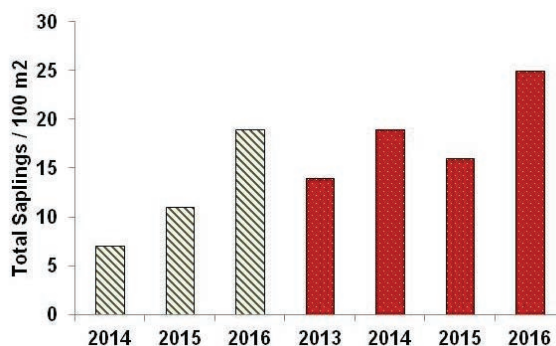


Fig. 3. Density of saplings throughout the study period 2013-2016 for both deer-accessible (left) and deer-excluded (right) plots.

Continued on page 4



Dear Friends,

All of us recognize the importance of Jug Bay Wetlands Sanctuary, but we may have different reasons why we think it is important. We may come here just to relax and see a minimally impacted, non-urbanized, wild area in a major metropolitan area. Some of us come for the programs to take advantage of educating ourselves about environmental issues, while still others volunteer to help with the monitoring programs to record the changes imposed by the myriad of external influences of climate change and the increasing scale of regional development. Whatever our reasons, though, each one of us contributes to the stewardship of Jug Bay.

In considering the future of Jug Bay, I began thinking about what stewardship actually means. It's a term that we all feel we can relate to, but I have only ever thought about in the abstract. The dictionary gives us only a hint; it defines "stewardship" as "the conducting, supervising, or managing of something; especially: the careful and responsible management of something entrusted to one's care."

Wikipedia adds another connotation: "Stewardship is now generally recognized as the acceptance or assignment of responsibility to shepherd and safeguard the valuables of others." This definition adds the important element of accepting responsibility. It implies taking action, but it only characterizes what the outcome of your actions should be. It doesn't tell you what or how to effect them.

In 2019 the Jug Bay Farm (aka the Rigglesman Preserve) will become a major addition to the main part of the Sanctuary. This expansion will offer the opportunity to enhance existing programs and to offer new programs at the Sanctuary. So in our role as stewards, how should The Friends of Jug Bay (FOJB) support this effort?

Currently, FOJB is an all-volunteer organization, and the level of support that our membership provides is adequate to support existing programs at the Sanctuary. Expanding our efforts will increase the demand for the time and efforts of our volunteers. To meet the needs of an expanded effort, we must increase our donor base. To accomplish this will require more effort and different strategies than our current all-volunteer organization can provide. It will require FOJB to move from an all-volunteer organization to one with professional staff, supported by volunteers. The staff's function, clearly, would be separate from the operation of the Sanctuary's programs and would primarily focus on managing the organization's operational activities. These would include developing donor outreach, evolving communication strategies, and managing social, print and online communications. This would be a huge leap for our organization, and a task, in reality, that would and could not occur in one fell swoop.

The move toward a staffed organization is a goal and one that should not be taken without much discussion and consensus among our members.

Many organizations like ours make the transition slowly by engaging part-time staff and increasing their duties as organizational growth provides the appropriate financial support. Since financial support is the key, we will need to enlist members and/or to recruit members, especially board members, with experience in fundraising.

We will not have to make a final commitment until January 2019, but, hopefully, we will be able to reach consensus before that deadline. We have established a committee and have just started to explore the options and supporting details that such a transition would require. At the 2017 annual meeting, we should be able to present an interim report by the committee, and by the 2018 meeting, the options should be clear.

At this early stage, I am asking each of you to think more deeply about this transition. Please offer us your thoughts and opinions on any aspect of this important topic. (You can reach me at altucker@friendsofjugbay.org.)

Al Tucker, *President, Friends of Jug Bay*

SAVE THE DATES

Soup and Science Lecture Series

***Sunday, January 8, Sunday, February 8, and
Sunday, March 12, 12:00 pm - 3:00 pm***

Enjoy hearty homemade soup and fresh bread with fellow nature lovers. Then sit back with dessert and enjoy listening to a guest speaker. Don't forget to bring your JBWS Soup & Science crocks and spoons! Don't yet have a crock? Purchase one for \$10 at the event.

See page 6 for a write up about upcoming lectures.

We welcome new and returning FOJB members:

<i>Don Anderson</i>	<i>John S. Kidd</i>
<i>Dale Bowen</i>	<i>Paula Kuruc</i>
<i>Sandra Burch</i>	<i>Barbara Lopez</i>
<i>Camilla Day</i>	<i>Bradley R. Mann</i>
<i>Nick and Sierra Defelice</i>	<i>Frank Marengi</i>
<i>Michael and Rebecca</i>	<i>Heather and Jay Marsh</i>
<i>Dois</i>	<i>Wes Merchant</i>
<i>Jennifer and Henry</i>	<i>David Moring</i>
<i>Dwyer</i>	<i>Matthew James Muir</i>
<i>Jackie Eanes</i>	<i>Helen Orme</i>
<i>Meg Faller</i>	<i>Nancy Swenton</i>
<i>Jon Farrington</i>	<i>Mary Sue Teony</i>
<i>Grant Godfrey</i>	<i>Jackie Warriner</i>
<i>Robert K. Graham</i>	<i>Marcia Watson</i>
<i>Hester Graves</i>	<i>Pamela Willet</i>
<i>Yesceni Hayes</i>	<i>Julie Wood</i>
<i>Richard B. Karel</i>	<i>Mariah Yager</i>

Friends of Jug Bay Welcome Two New Board Members

The Friends of Jug Bay added two new board members in 2016: Judy Hartman and Dan Levin. We welcome their expertise, enthusiasm, and commitment to service, and we look forward to their contributions.

Judy Hartman had parents who were both teachers, and both had degrees in biology. There were four kids in her family and limited funds, so all of her vacations involved camping. She remembers hours of hiking, and every hike was an opportunity for a natural history lesson. She and her siblings absorbed a comprehensive basic



Judy, China, and Coffee at home on the farm. Photo by Matthew Beyler.

knowledge of nature without realizing it, and she still remembers the shock she felt when she realized that many people could not tell the difference between a maple and an oak tree! Judy grew up to get an undergraduate degree in biology, then a doctorate in chemistry. She started her career as a scientist in industry, then spent the past 20 years as a chemistry professor at the Naval Academy. Along the way, Judy and her husband raised two sons and moved to a farm where they raise Welsh ponies and vegetables and keep a dozen chickens. She still spends a lot of time outdoors and firmly believes that all children should have the opportunity she had to roam the woods and learn about the natural world. When Judy's sons were small, they visited Jug Bay, and now that she is approaching retirement she is honored to have the opportunity to help Jug Bay in its mission of opening up the wonders of the natural world to all children.

Daniel M. Levin is a Clinical Assistant Professor in the Department of Teaching and Learning, Policy and Leadership at the University of Maryland, College Park. He began his teaching career as a middle school science teacher in the Washington, D.C., metropolitan area and taught secondary public school science for nine years. He



Dan Levin and friend. Photo by Drew Irwin.

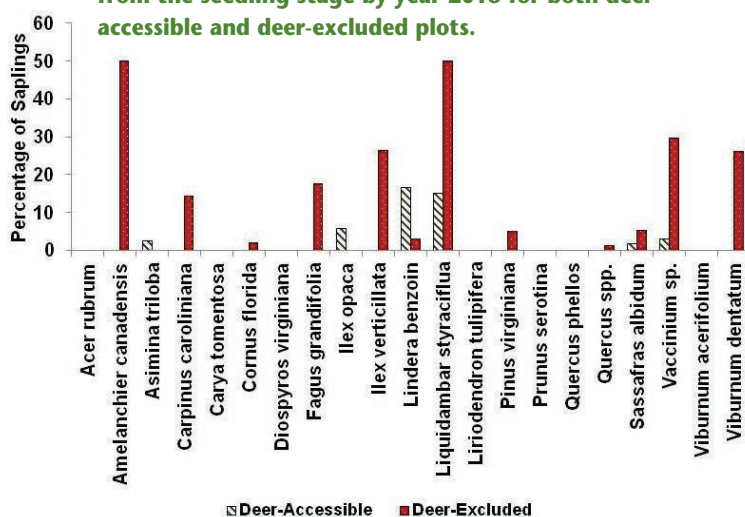
taught high school biology, chemistry, science research methods, and earth and environmental science and served as coordinator of a STEM academy and, during this time, Dan spent a summer as a naturalist at Jug Bay! Since earning his doctorate in 2008, Dan has taught a variety of education courses, primarily science and mathematics pedagogy, biology education courses, and action research. His main research interest is in understanding the dynamics of teachers' attention in the science classroom, specifically understanding how and when science teachers attend and respond to the substance of students' scientific thinking and how teachers' attention is shaped and constrained by the cultural systems in which they work. Dan's other research interests include science and mathematics teacher education, socio-scientific issues, students' participation in scientific practices, and disciplinary writing in science.

Deer management continued from page 2

d. Of all the species, *Amelanchier canadensis* and *Liquidambar styraciflua* were the species that had the highest number of seedlings moving into the sapling stage in the deer-excluded plots, while *Lindera benzoin* and *Liquidambar styraciflua* had the highest numbers in the deer-accessible plots.

General Observation. After 7 years of deer management, it seems that seedling species diversity in the forest is good, with a total number of 21 species recorded in this study by 2016. However, of all of these species, only six of them (Figure 4) have been able to successfully grow into the sapling stage without the protection of artificially established exclosures. If this trend continues, as the forest ages it may experience a shift of species dominance and a loss of diversity. Therefore it is recommended that deer management efforts continue and even intensify.

Fig. 4. Percentage of saplings, given by species, that grew from the seedling stage by year 2016 for both deer-accessible and deer-excluded plots.





Susana Barañano tests out the new scope while Dave Mozurkewich looks on. Photo by Nick Iascone.

Jug Bay Holds Ribbon Cutting for Deck-Mounted Observation Scope

On the blazing hot August day of the Friends of Jug Bay Picnic, Jug Bay held a ribbon-cutting ceremony for a new deck-mounted observation scope, the culmination of months of fundraising by the Friends of Jug Bay and many generous donations from the Jug Bay community. During the research phase, several knowledgeable volunteers lent their expertise on observation scopes, helping to narrow down the field of possibilities, choose the best model for our needs and budget, and suggest the best place on the deck to mount the scope. The Fujinon 15 x 80 MT Binocular will be used both in Sanctuary educational programs and by public visitors. Birders in particular will benefit from the closer view of winter waterfowl the scope offers from this famous Jug Bay vista. We thank FOJB and all those who contributed to the purchase of the scope for their donations, Dave Mozurkewich and Froede Jacobsen for their inputs on optics, and Donald Smith for mounting the scope on the deck.



Darcy Herman, Dave Mozurkewich, and Al Tucker break through the ribbon on the observation deck celebrating Jug Bay's new observation scope. Photo by Philippe Hensel.



A visitor enjoys the view from the deck under a new power. Photo by Nick Iascone.

Open Hours:

Sanctuary Wetlands Center: Wednesdays, Fridays, and Saturdays, 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)

Wootton's Landing Wetland Park: daily, dawn to dusk (fishing, loop trail, hand-carried boat launch)

Sanctuary Wetlands Center admission fee: \$6.00 per 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 for directions, information and updates to our schedule.

Registration is required for all programs. Please call 410-741-9330 or email programs@jugbay.org to register. All programs meet at the Wetlands Center at 1361 Wrighton Road unless otherwise noted. An adult must accompany children under 13.



Trail Monitors Potluck

Saturday, December 10, 11:30 am – 2:00 pm

Ages: Adults and their families

Fee: Free

This workshop is for existing Trail Monitors, Adopt A Plotters, and new volunteers interested in joining either of the programs. Existing Trail Monitors and Adopt A Plot volunteers will have a chance to share their experiences. New volunteers will have a chance to learn about the program and adopt available trails of their own. Bring a favorite dish to share. We'll also take a hike, weather permitting. **Registration required:** Call 410-741-9330 or e-mail programs@jugbay.org.

Winter Solstice Hike

Wednesday, December 21, 2:30 pm – 4:30 pm

Ages: 12 and older

Fee: \$6/vehicle entrance fee

Welcome winter with a brisk hike through the Sanctuary. Enjoy great views of the Patuxent River, and watch the sun set over the marsh. **Registration required:** Call 410-741-9330 or e-mail programs@jugbay.org.

Skunk Cabbage Swamp Stomp

Sunday, January 22, 1:00 pm – 3:00 pm

Ages: 12 and older

Fee: Free

Volunteer Siobhan Percey studied skunk cabbage and learned a lot about this unusual wetland

Preschool Nature Series

First Friday of each month (generally),

10:00 am – 11:00 am

Ages: 3–5

Fee: \$2 per child

Children enjoy sensory activities and learn about nature through an interactive story, craft and hike. Dress for outdoor exploration and hands-on learning. Extend your visit with free play at our Nature Play Space. **Registration required:** Call 410-741-9330 or e-mail programs@jugbay.org.

Guided Birdwalks

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.



Soup and Science Lecture Series

Sunday, January 8, Sunday, February 8, and Sunday, March 12, 12:00 pm – 3:00 pm

Enjoy hearty homemade soup and fresh bread with fellow nature lovers. Then sit back with dessert and enjoy listening to a guest speaker. Don't forget to bring your JBWS Soup & Science crocks and spoons! Don't yet have a crock? Purchase one for \$10 at the event.

Register online at www.friendsofjugbay.org.

Sunday, January 8: Brian Knox, President of Sustainable Resource Management, Inc., and supervising forester of Eco Goats. Brian will discuss his work in shaping forestry practices to obtain sustainable systems and will share how Eco Goats became an important part of his program several years ago.

Sunday, February 8: Dr. Ralph Eshelman, researcher and author of several books relating to his military and Chesapeake interests, will discuss alewives, bugeyes, manoes, sooks, and skip-jacks and give a historical perspective of the seafood industry in the Chesapeake with some specifics to the Patuxent River.

Sunday, March 12: TBA



inhabitant. Join her for an off-trail adventure to visit this fascinating plant, in bloom, along the swamp edges. Wear boots that can get wet. Registration required: Call 410-741-9330 or e-mail programs@jugbay.org.



Winter Tree Identification Workshop

Saturday, February 11, and Saturday, February 18, 9:00 am - 2:00 pm

Ages: 18 and older

Fee: \$10/person

Ever wonder what kind of tree are you looking at during your winter hike? This is your opportunity to learn tree identification by looking at signs such as bark, buds, and twigs. Join experienced forester Earl "Bud" Reaves for a hands-on tree ID workshop involving a learning session indoors followed by a hike to practice your new skills. Please bring lunch. Registration required: Call 410-741-9330 or e-mail programs@jugbay.org. Minimum people: 6

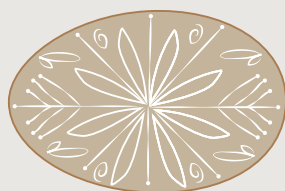
Pysanky: Ukrainian Egg Decorating

Saturday, February 25, 10:00 am - 2:00 pm

Ages: 12 and older

Fee: \$25/person

Create a beautiful egg in the time-honored Ukrainian tradition of Pysanky. This workshop will explore the art in a free form, using symbolism that tells a specific story. Bring a bag lunch. Pre-registration and payment are required by February 10th. Space is limited. To register, call 410-741-9330 or e-mail programs@jugbay.org.



Inoculation canisters releasing Tree-Azine into the cambium layer of a marked ash tree. Trees' DBH (diameter at breast height) were used to determine the amount of solution injected. Photo by Melinda Fegler.

Initial Results from Ash Borer Research Project Rising from the Ashes

By Melinda Fegler, *Volunteer and Stewardship Coordinator,*
Jug Bay Wetlands Sanctuary

The invasive Emerald Ash Borer (EAB) beetle (*Agrilus planipennis*) has threatened stateside ash trees (*Fraxinus* spp.) since 2002. In 2015, 87 ash trees were identified on the Jug Bay Wetlands Sanctuary proper and Glendening Nature Preserve that were within the parameters that made them likely to benefit from treatment with insecticide to combat EAB (i.e., visibly infested ash trees with less than 30% canopy loss; ash trees within 15 miles of visibly infested ashes, even if they are not visibly infested themselves; and high-value ash trees more than 15 miles from visibly infested ashes). The task of inoculating these trees could not have been completed without our great partners Tyler Wakefield, Christine Sullivan, and Colleen Kenny from the Maryland Department of Natural Resources Forestry Department and Anne Arundel County Forester Bud Reaves.

With a grant from the Chesapeake Bay Trust and additional assistance from the Friends of Jug Bay, the Sanctuary purchased Tree-Azine and inoculation equipment in an attempt to save our properties' Green Ash (*Fraxinus pennsylvanica*), White Ash (*Fraxinus americana*), and two very large Pumpkin Ashes (*Fraxinus profunda*; one possibly a state champion tree). During the summer of 2015, Jug Bay staff and volunteers and the Anne Arundel County Forestry Department treated all 87 labeled trees. The results taken in the summer of 2016 indicate that the treatments were successful, with 36% of the trees exhibiting no sign of continued infestation and 65% showing less than 10% further dieback.

EAB has rarely been treated in a preserve setting because public lands rarely have the resources to identify stands of ash, the funding to procure insecticide and equipment, or the manpower necessary for monitoring efforts. Jug Bay is very proud to be one of the few examples of proactive treatment outside of municipalities and homeowners' associations. Our efforts to treat these trees will continue next summer, as they will need re-inoculation every two years.

VOLUNTEER OPPORTUNITIES

- Most of our projects require no experience. Always keep your eye out for new opportunities.
- Vehicle admittance fee waived for volunteer events.
- New online volunteer registration form: We encourage you to register online for volunteer opportunities at <http://tinyurl.com/jbws-volunteer-registration>. Got feedback on this tool after trying it out? Please send your suggestions to Melinda Fegler.

For more information, call 410-741-9330, or e-mail Volunteer & Stewardship Coordinator, Melinda Fegler, at rpfegL00@aacounty.org.

Groups must call to arrange a separate event, unless otherwise noted.

Ongoing Bird Survey

Thursdays: December 8 and 22; January 5 and 19; February 2 and 16; 7:30 am - 9:30 am

Ages: 12 and older

Come and join the amazing volunteer birding team of Jug Bay Wetlands Sanctuary! The ornithological knowledge of this team makes for a phenomenal learning and collaborative experience. All of this in the beautiful early morning light of the Jug Bay wetlands on the Patuxent River.

Vernal Pool Monitoring

Fridays: December–February; start and end times vary (register for notification)

Ages: 10 and older

Join our vernal pool monitoring volunteer team. We will hike out to assess hydrology and salamander and frog activity at each of our pools. Volunteers experience the variety of Jug Bay Wetlands Sanctuary habitats as well as those of Glendening Preserve. **Registration required:** <http://tinyurl.com/jbws-volunteer-registration>.

Goat Caretaker Update and New Training

Saturday, December 10, 2:30 pm - 4:30 pm

Ages: Adults and their families

Fee: Free

For new and existing Goat Team volunteers. The first hour of this training will start with an introduction of our goat team and historic husbandry needs. The second hour we will discuss changes that we have learned were needed.

Registrations Required: <http://tinyurl.com/jbws-volunteer-registration>.

Stream Water Chemistry

Friday, December 16, 9:30 am to 10:30 am (Galloway Creek); Saturday, December 17,

9:30 am to 10:30 am (Two Run Branch) and 1:00 pm to 2:30 pm (Pindell Branch)

Friday, January 20, 9:30 am to 10:30 am (Galloway Creek); Saturday, January 21, 9:30 am to 10:30 pm (Two Run Branch);

Saturday, January 21, 1:00 pm to 2:30 pm (Pindell Branch);

Friday, February 17, 9:30 am to 10:30 am (Galloway Creek); Saturday, February 18, 9:30 am to 10:30 am (Two Run Branch) and 1:00 pm - 2:30 pm (Pindell Branch)

Ages: 16 and older

Volunteers will conduct field tests on dissolved oxygen content and other parameters. Water samples are also collected for lab analysis.

Registration required for new volunteers: <http://tinyurl.com/jbws-volunteer-registration>.

River Clean-up [Patuxent Wetland Park]

Friday, December 23, 2:00 pm - 4:00 pm

Ages: 16 and older

Volunteers will enjoy a boat ride to Patuxent Wetland Park, then remove trash from the river to be hauled back on the boat. PFDs, gloves, and bags will be provided. Bring sunscreen, sun hat, sunglasses, water, and closed-toe shoes that can get wet and muddy. Spots are limited.

Registration required: <http://tinyurl.com/jbws-volunteer-registration>.

Deer Spotlighting

Wednesday, December 28, Wednesday, January 25, and Wednesday, February 22; 5:30 pm - 8:30 pm

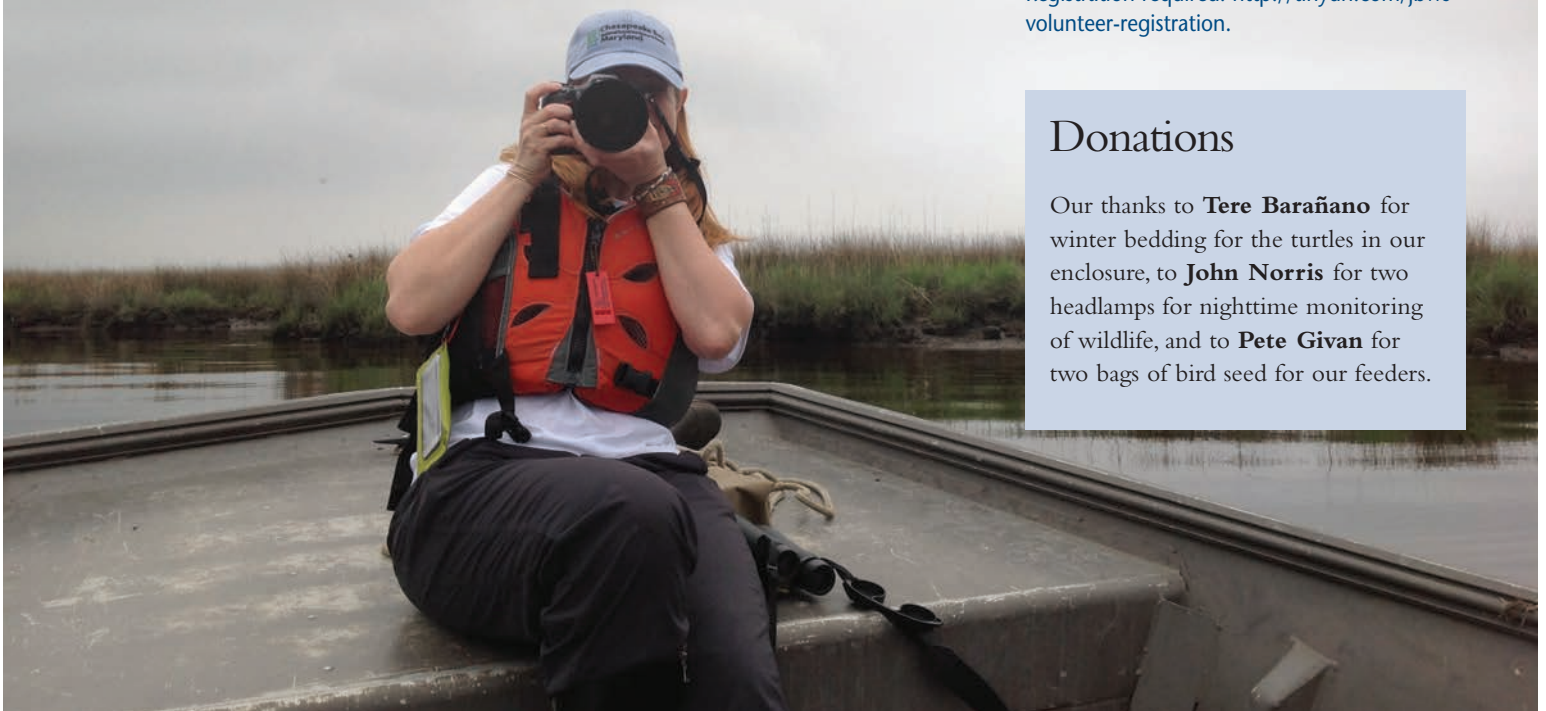
Ages: 15 and older

We are launching a White-Tailed Deer spotlighting program to help us monitor the deer populations at our properties. Spotlighting occurs the last Wednesday of every month an hour after sunset. Be prepared for cool temperatures and being outside in a slow-moving vehicle.

Registration required: <http://tinyurl.com/jbws-volunteer-registration>.

Donations

Our thanks to **Tere Barañano** for winter bedding for the turtles in our enclosure, to **John Norris** for two headlamps for nighttime monitoring of wildlife, and to **Pete Givan** for two bags of bird seed for our feeders.





The new arbor at the Plummer House Butterfly Garden. Photo by Liana Vitali.

Eagle Scout Builds for Butterflies

By Melinda Fegler

Over the years the Sanctuary has been graced with numerous Eagle Scout projects. Anyone who has overseen one of these projects knows the process can be grueling and difficult to maneuver through. That is why we feel so lucky to have had so many beautiful, well-built improvements to our properties. The arbor at the Plummer House Butterfly Garden is the latest addition to this list.

The new arbor will not only please our public visitors but will also offer a well-deserved spot of shade for our Butterfly Garden volunteers, who labor weekly starting in early spring through the fall to design, plant, weed, and otherwise maintain the garden. Visitors and volunteers have Eagle Scout candidate Justin Magill, of Boy Scout Troop 908 of Hughesville, Maryland, to thank for the arbor. Troop 908 happens to hold the record for the highest number of Eagle Scouts graduating out of their Southern Maryland program, and Justin has been a scout there since he was a mere Cub at 7 years of age. This fall Justin is a high school senior at Kings Landing Academy, where he will graduate in 2017. With devoted parents Michelle and Rick Magill, Justin has earned almost every patch and accolade necessary to promote him to Eagle Scout before he graduates from Kings Landing Academy and heads to the Navy. Justin is an outdoor kid who loves to fish, crab, hunt, and camp with his scout leader dad. Through Justin's journey with the Boy Scouts he went from a Cub at 7 to a leader of Troop 908 at 17. Having worked with Justin through the process of constructing the arbor, I came to discover yet another local family with a tremendous work ethic and creativity, with a smile on their faces and in their voices. The Magill family truly defines the name of their longtime family-run business they assist with, Friendship Trees and Christmas Shop in Friendship, Md. We thank Justin and his family and wish him the very best of luck with his Naval Academy goals. He is the quintessential Eagle Scout, and the Sanctuary is proud to have been chosen to host his project.

Fall Volunteers:

Cal Baier-Anderson	Chuck Hatcher	Cyndi Reynolds
Tere Barañano	Yasmine Hentati	Gordon Reynolds
Marty Barron	Darcy Herman	Barbara Ricciardi
Woody Barron	Ella Igwe	Jennifer Rooks
Mike Blackstone	Regina Kreger	Rick Rooks
Susan Blackstone	Jack Krusburg	Doris Schmitz
Cynthia Bravo	Dave Larrabee	Anna Schollenberger
Susan Brockman	Nick Lascone	Mary Kay Sistik
Tanya Booth	Lloyd Lewis	Joan Slettvet
Peggy Brosnan	David Linthicum	Bob Smith
Gordon Burton	Alec Loudermilk	David Smith
Mary Burton	Andrea Loudermilk	Linda Smith
Danny Bystrak	Cliff Loudermilk	Chris Taylor
Caroline Camero	Barb Mann	Katheen Turk
Karen Caruso	Brad Mann	Pete Uimonen
Alan Christian	Chuck McClain	Sue Waddington
Regan Christian	Rob McEachern	Anna Watson
Rebecca Christopher	Pat Melville	Peter West
Mike Cunningham	Amanda Mink	Suzanne White
David Davis	Edward Miller	Bob Williams
Damara Dayton	Angela Mitchell	Sea Williams
Cathryn Dippo	Amy Moody	Sue Williams
Margie Dowsett	Kelly Moorehead	Dave Williamson
Kim Elliott	Dave Mozurkewich	Kris Wood
Erin Engstrom	Anne Muecke	Volunteer Groups:
Kristen Enzinger	Manfred Muecke	Eleanor Roosevelt
Detolla Family	Matthew Muir	High School
Gramlich Family	Dotty Mumford	(Greenbelt, MD)
Lind Family	Jennifer Muro	AP Biology
Lee Fisher	John Norris	The Harbor School
Elaine Friebele	Jim Oland	of Annapolis
Noëlli Garcia	Carolyn O'Reilly	University of Maryland
Madeline Gardiner	Matthew Payne	School of Business
Joyce Gillespie	Siobhan Percey	University of Maryland
Diane Goebes	Dave Perry	S.E.A.
Ernie Goins	Beth Petenbrink	During the fall,
Zeke Gonzales	Meghan Petenbrink	volunteers logged
Edwin Granados	Tom Petska	1580 hours.
Sharon Griffing	Bob Plunkett	A contribution worth
Julie Haimes	Jean Prigelmiller	over \$41,760!
Jim Harle	Mike Quinlan	
Lauren Hartman	Dom Raino	
Bev Hatcher	Tim Reichard	

Thank You!

Education Profile:

High School Students Investigate How Land Use Is Connected to Plankton at Reserve Sites



Copepod as seen through the microscope. Photo by Amy Henry.

By Amy Henry, *Maryland Department of Natural Resources*

“What IS that???” a Broadneck High School AP biology student exclaims, squinting into the microscope eyepiece. “Ooooh.....” squeals another. “Check out this thing! It looks like a segmented hair, but it’s totally moving on its own!” It’s plankton identification lab time at Jug Bay Wetlands Sanctuary as part of the Plankton Land Use and Nutrient Studies (PLANS II) field trip for Broadneck students. PLANS II, offered to high school students in Anne Arundel, Prince Georges, and Harford Counties at Chesapeake Bay National Estuarine Research Reserve (CBNERR) component sites, provides a student-driven, investigative, meaningful educational experience based on real-life environmental issues. Students who participate learn firsthand the issues associated with sediment and nutrient runoff and the consequent eutrophication of our waterways.

Their experience begins in the

classroom. Teachers work with Reserve educators from Jug Bay Wetlands Sanctuary, Patuxent River Park, or the Anita C. Leight Estuary Center to prepare students for their field work. At school, students explore nutrient enrichment, culturing algae with varying amounts of liquid fertilizer. Next, the students participate in a day-long field trip at a Reserve site, learning to identify plankton and participating in a nutrient limitation experiment and collecting water quality data aboard a pontoon boat. The students perform tests for water clarity and temperature and test for nitrogen, phosphorous, and pH. They also conduct a bioassay to explore the grazing capacity of oysters to demonstrate the important role that filter feeders play in helping to clean the Bay.

Through experiential learning, students have shown improvements in attitude and knowledge about the health of the



PLANS II students culture algae with liquid fertilizer. Photo by Coreen Weilmminster.



PLANS II students discover the grazing capacity of filter-feeding oysters. Photo by Coreen Weilminster.



Teacher Matt Bem testing pH with PLANS II students. Photo by Coreen Weilminster.

Chesapeake Bay. PLANS II provides a model for teacher training, a curriculum, and Meaningful Watershed Educational Experiences to help students increase their understanding of their role in the eutrophication of the Chesapeake Bay and their role as stewards in helping to restore the health of this iconic estuary.

PLANS II is a partnership among CBNERR, the Maryland Department of Natural Resources, the Society for Ocean Sciences, and Morgan State University's Patuxent Environmental & Aquatic Research

Laboratory, funded through a B-Wet grant from NOAA. The sites are currently in the third year of offering this high-quality, rigorous environmental education/science field trip to high school students, and they are looking to expand to other interested high schools. If you would like to learn more about the project or have your students participate, please contact JBWS Education Coordinator Liana Vitali at rpvita23@aacounty.org.

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**

W I N T E R 2017



DEPARTMENT OF RECREATION AND PARKS

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



SAVE THE DATES

Soup & Science Lecture Series

Sunday, January 8, Sunday, February 8, and Sunday, March 12, 12:00 pm - 3:00 pm

Enjoy hearty homemade soup and fresh bread with fellow nature lovers. Then sit back with dessert and enjoy listening to a guest speaker. Register online at www.friendsofjugbay.org.

Sunday, January 8: Brian Knox

Sunday, February 8: Dr. Ralph Eshelman

Sunday, March 12: TBA

See page 6 for details...

