MARSH NOTES

JUG BAY WETLANDS SANCTUARY NEWS VOLUME 22, NUMBER 1 SPRING 2008

"Citizen Science" Presented at Research Symposium

Speakers at the Volunteer Research Symposium on March 29 included (from left): Sue Riccardi, Jeff Campbell, Pete Uimonen, Sandy Teliak, Sandy Barnett, Lisa Siciliano, Dave Davis, and Mike Quinlan.

It's hard to imagine very many volunteer research programs where you get to capture and measure salamanders, determine the age of a migrant songbird held in your hand, or estimate the age of a forest. Jug Bay volunteers also examine how marshes reduce pollution, they count flocks of canvasbacks, and they walk through vernal pools catching tadpoles. At the Sanctuary, volunteers have a unique opportunity to gain knowledge about the ecology of wetlands and forests while taking measurements in the field, monitoring plant and animal communities, and recording data of all sorts. Most of all, say volunteers, hands-on field work is fun!

Since the Sanctuary was created in 1985, volunteers and staff naturalists have worked together to study the ecology and environmental conditions of the wetlands and uplands along the Patuxent River estuary. These are long-term studies, tracing patterns in plant and animal populations and trends in water quality over time. When staff and volunteers search our growing computerized databases for significant patterns, we find that many of our studies yield significant and interesting results.

Contents

On Saturday, March 29, 60 people gathered at Quiet Waters Park in Annapolis to learn more about the Jug Bay research program straight from eight long-term volunteers. These brave volunteers spent several months working with us to crunch data, find appropriate ways to display and summarize the data, and finally, to make an attractive and informative PowerPoint presentation. These presentations, filled with colorful photos, graphs and charts, described the local ecosystem in fascinating detail: when salamanders move to breeding places; how much space a box turtle requires to find food and to reproduce; how invertebrates in Patuxent estuary muds affect the distribution of the waterbirds that prey on them; and how some songbird species appear to thrive at Jug Bay while they may be declining elsewhere.

The volunteers gave excellent and animated talks about their research, just as professional scientists do. We thank them for their efforts and their commitment. We hope you enjoy reading these brief synopses describing the highlights of each talk.

Jug Bay Wetlands Sanctuary
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Lothian, MD 20711
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Jug Bay Home page:
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 and environmental education. The Sanctuary is a limited-use park. Visitors are requested to make a reservation by calling the office before planning a visit.

Jug Bay Wetlands Sanctuary is a member of the Chesapeake Bay - National Estuarine Research Reserve Maryland system, which promotes scientific research, public education, resource management and stewardship in estuarine reserves across the nation.

Marsh Notes **is produced quarterly by Jug Bay Wetlands Sanctuary. Comments and suggestions are welcome.**
Editor: Elaine Friebele
Graphic Design: Liz Fisher, Grafix Galore in Easton, MD, 410-822-6305

This newsletter is printed on recycled paper.

Friends of Jug Bay Member Programs for 2008

These activities are open to all FOJB members without charge

Wildlife- and Environmentally-friendly Home Landscaping

Saturday, May 10; 1:00 - 2:30 pm
Join Ray Bosmans (Professor Emeritus, College of Agriculture and Natural Resource Institute of Applied Agriculture, University of Maryland) as he discusses how to create beautiful terrestrial and aquatic habitats around your home that attract wildlife using plants native to the Mid-Atlantic area. Also learn how to manage these habitats with environmentally friendly methods of composting, mulching and biological control of pests. Ray will bring demonstration plants. Light refreshments will be served.

Observation Deck Soiree

Friday, July 18; 7:30 - 9:30 pm
Mingle with other members and enjoy a variety of refreshments while the sun sets majestically over the marsh. As this beautiful view changes to nightfall and the full moon rises, enjoy the magical sounds of the frogs and insects.

Weekend Weed Warrior Pizza Fest

Saturday, August 16; 10:00 am - 2:00 pm (including lunch)
Members are welcome to come out, get dirty and release their inner child while they remove invasive and deleterious plants growing at the Sanctuary. (No previous experience necessary; Sanctuary staff will be present to identify the target plants.) The work party will be followed by a pizza party and an awards ceremony for the "Best Weed Whacker," "Dirtiest Weed Whacker," and others who distinguish themselves that morning!!!

Annual Members Picnic

Sunday, September 14; noon - 4:00 pm
Enjoy a good old-fashioned outdoor barbeque at the Sanctuary's newly renovated Plummer House at the Glendening Preserve (accessed at the Plummer Lane exit to Route 4, through the yellow metal gates on the right). There will be plenty of hamburgers, hot dogs and veggie burgers to go around, plus lots of wonderful side dishes and desserts. Ymmmm!!

Get to Know Your Sanctuary

Saturday, October 18; 10:00 am - noon
Join the Sanctuary staff on an intimate walk around the Sanctuary to learn how to identify birds by their call and flight pattern, and the trees by their bark and leaf shape. After the easy, hour-long walk, there will be warm drinks and cookies awaiting everyone back at the Sanctuary center.

Farewell to Karyn Molines

We bid a fond farewell to long-time education coordinator Karyn Molines. In March, Karyn was promoted to a new position in our Department: Supervisor of the Cultural Resources Division, where she'll oversee several parks and historical sites. A key project for her will be coordinating the opening of the Naval Academy's Dairy Farm (now owned by the County) near Gambrills. Karyn will be missed by all those who worked with her over the years. Karyn was a superb and committed educator who expanded our offering and programs greatly during the 13 years she worked with us. Her overall knowledge about natural history and especially her experience with amphibian life cycles and with Maryland's native plants, were tremendous assets that she shared in creative ways with all Sanctuary visitors. Her enthusiasm for teaching about the environment generated a large and loyal following of teachers, students, and volunteers. We wish Karyn the best of luck in her new job!

FRIENDS OF JUG BAY

PRESIDENT'S LETTER

Dear Friends,

No matter the time of year, the beauty of the Jug Bay wetlands overwhelms visitors. That still beauty, though, masks a teeming ecosystem, struggling to perform the heroic task of improving the quality of the water flowing through on its way to Bay. At the Friends of Jug Bay annual meeting held on March 30, Dr. Walter Boynton of the Chesapeake Biological Laboratory reminded us of just what wetlands do and why they are important, if not critical, to us. Nitrogen and phosphorus, often considered "bad things," are really just too much of a "good thing". In fact, they are essential nutrients, critical for life.

The Chesapeake Bay is one of most nutrient-sensitive coastal marine systems in the country. Excess nitrogen and phosphorus fuel algal blooms that occlude light and cloud water, killing submerged aquatic vegetation (SAV), the basic food system that supports the unique ecosystem of the Bay. Data taken at Jug Bay and analyzed at Dr. Boynton's lab show that the wetlands clean 80% - 90% of the nitrogen and phosphorus from the water as the diurnal tides flood and ebb from the marshes. With the help of nitrifying bacteria, the marshlands act as a huge water filter that sequesters nitrogen in the mud. Incredibly, the wetlands use some of this nitrogen to sequester a tremendous amount of carbon, converting 10.5 tons of dry matter per year compared to 1.5 for a wheat crop. In spite of this heroic effort, the wetlands along the Patuxent have not been able to keep up with the nutrient overload. Dr. Boynton's research indicates that a reduction by a factor of six could lead to a sustainable balance. If this number is correct, it means the situation is not hopeless, and the Jug Bay Wetlands Sanctuary is ideally suited to raise public awareness and demonstrate the incredible value of wetlands not only to citizens of Anne Arundel County but also to all of Maryland.

The mission of the Friends of Jug Bay (the Friends) is to support the preservation, development and operation of the Sanctuary; to foster education and research programs that increase public awareness of, interest in, and appreciation of the history and ecology of the natural environment of the Patuxent River, especially Jug Bay, its wetlands and surrounding environs; and to sponsor affiliated organizations to facilitate these purposes.

This year the Board of Directors will explore ways to enhance and expand their breadth and scope these activities.

Education provides learning opportunities for people of all ages. Involving young people with direct hands-on activities in the Sanctuary provides the best investment for developing future environmentally aware citizens. To bring elementary and middle school children to the Sanctuary, the Friends will continue to underwrite transportation costs for schools needing support.

Research represents the bedrock of the Sanctuary. Universities and other research institutions use the natural resources of the Sanctuary. Several graduate students have obtained advanced degrees based on data and observations at Jug Bay. The Friends would like to enhance and broaden the research horizons to include all aspects of the Sanctuary's unique ecosystems and increase support for research interns.

Environmental Stewardship is the careful and responsible management of something entrusted to one's care, and the Friends of Jug Bay have this important responsibility for protecting the environmental integrity of the Sanctuary. The Friends monitor threats caused by human activity that directly affect the Sanctuary and take appropriate actions to ensure the best outcomes for the Sanctuary.

Public Outreach is a priority. Therefore, we wish to create more opportunities for members to interact with the resources of the Sanctuary. We will develop a series of spring and fall demonstrations, activities, and seminars to help our members be environmentally aware citizens. The topics should range from serious discussion of environmental issues to activities that individuals can use to make a difference. They will provide an important opportunity for members to network with like-minded supporters.

Many Friends members who volunteer at the Sanctuary perform much of its intramural work. However, the Friends want to develop more extramural activities to publicize the need for preserving and restoring wetlands like Jug Bay.

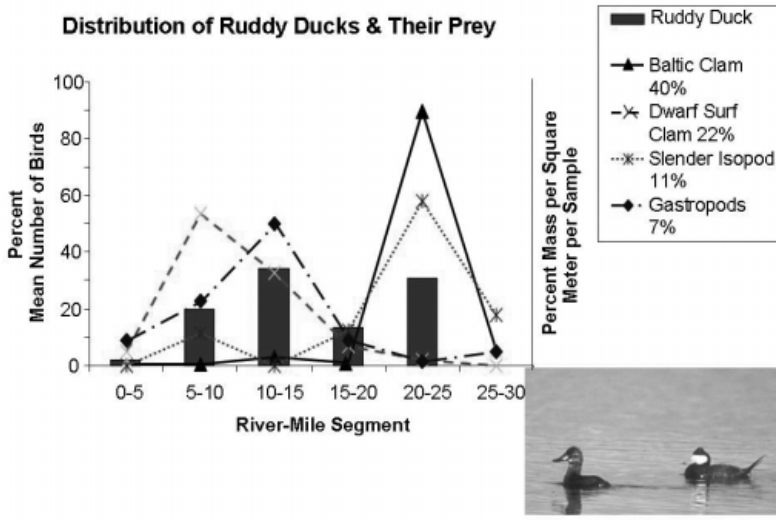
Al Tucker, President FOJB

The FOJB is a nonprofit organization that supports and enhances Sanctuary activities.

fojbws@yahoo.com

Comparing the Distributions of Winter Diving Ducks and their Benthic Invertebrate Prey on the Patuxent River Estuary

Chris Swarth and Sue A. Ricciardi



We carried out annual mid-winter surveys to study the distribution of wintering waterbirds on the Patuxent River estuary from 1999 to 2005. Our study showed that diving ducks occupied species-specific ranges along the estuary, from the mouth at Solomons upriver 45 miles to Hill's Bridge. A key finding that resulted from our study is that diving duck species occupy specific regions along the length of the estuary where their preferred benthic food prey is concentrated. We compared our data on bird distribution with two other existing datasets: benthic invertebrate data from the Chesapeake Bay Program (Patuxent River estuary), and Bay duck diet information from the Patuxent Wildlife Research Center (PWRC). For this presentation, major invertebrates in the diets of three species, Ruddy Duck (Oxyura jamaicensis), Canvasback (Aythya valisineria), and Long-tailed Duck (Clangula hyemalis) based on studies by PWRC, were compared with our distribution data on the Patuxent. Biomass data on invertebrate food organisms obtained through benthic sampling of the Patuxent River were analyzed to examine the relative abundance (by percent mass per m2) in five-mile river segments along the length of the estuary. Relative abundance distributions were constructed for the three diving duck species using these same 5-mile river segments. A comparison of the benthic invertebrate prey with duck distribution suggests that diving ducks congregate where their specific benthic prey are most abundant. Our results emphasize the importance of this estuarine ecosystem to waterbirds and reveals unexpected patterns of bird distribution: information that provides a deeper understanding of an important Maryland estuary.

Sue Riccardi is a retired Anne Arundel Community College mathematics professor and a long-time birder. She has volunteered at the Sanctuary for more than 20 years.

Using Constant-effort Mist Netting to Study Survivorship and Productivity of Select Songbirds

Sandy Teliak and Chris Swarth

Survivorship and breeding activity of this Red-eyed Vireo, banded at the Sanctuary, can be tracked when it is spotted within its wintering grounds in South America or recaptured at Jug Bay the following year.

The MAPS program (Monitoring Avian Productivity and Survivorship) is a continent-wide, bird banding research effort started in 1989 by the Institute for Bird Populations (IBP) in Point Reyes, California. A goal of this program is to gather data during the breeding season on adult population size, survival rates, and breeding productivity for over 100 targeted migrant and resident songbird species. The banding study at Jug Bay, the fifth oldest and longest-continuing of the 800+ MAPS stations, has provided invaluable information to this national monitoring effort.

Using a constant-effort, mist netting study approach, we banded over 2,200 birds of 61 different species. About 75% of birds we banded were neo-tropical migrants and about 25% were year-round residents. We determined that the populations of some migrant birds, for example Red-eyed Vireos and Wood Thrushes, remained more stable over time than they did elsewhere in Maryland, based on comparisons of our data with those of the Breeding Bird Survey population trend estimates from across the state.

We also examined songbird recapture/survivorship and productivity rates. Forty-seven percent of resident species banded were hatch-year birds (birds hatched during the season of their banding), whereas only 17% of neotropical migrant species were hatch-year birds. The low capture rate for migrant hatch-year birds is probably related more to several aspects of our study methods (migrants often nest higher in the canopy, thus reducing capture in our low nets; migrants move out of our study area soon after hatching whereas residents do not) than to actual differences in breeding productivity between these two groups of songbirds.

We documented the effect of harsh winter conditions on certain residents, such as Carolina Wrens and Carolina Chickadees.

Sandy Teliak is retired from the federal government. He has also volunteered with turtle telemetry, construction projects, and the FOJB Board.

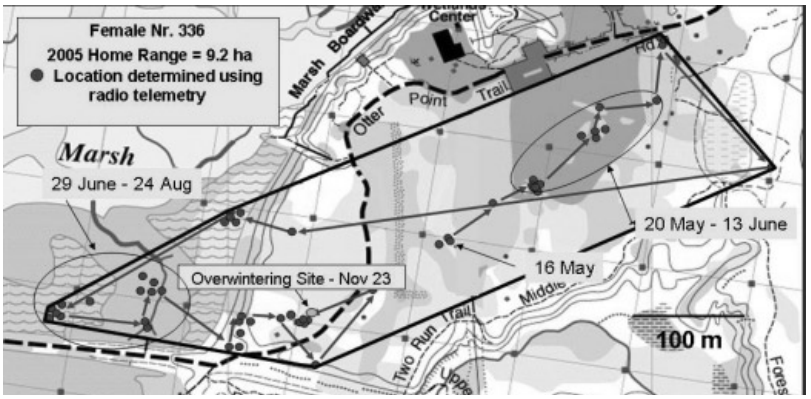
Box Turtle Behavior Revealed Through Radio Telemetry

Chris Swarth and Sandy Barnett

Radio telemetry is a useful, minimally-invasive tool for studying the home range and habitat use of the small, secretive Eastern Box Turtle, *Terrapene carolina carolina*. Telemetry studies at Jug Bay Wetlands Sanctuary over the past eight years have shown that adult males generally have smaller home ranges than adult females because males tend to stay in the forest year-round, whereas females use several different habitats (forests, meadows and wetlands) that are spaced far apart.

We have also observed that juvenile Box Turtles meet all of their nutritional and habitat needs within a small area and consequently tend to have much smaller home ranges than adults. In addition, juveniles are the only age class in which we have observed potential dispersal behavior.

Telemetry has also enabled us to determine that Box Turtles often overwinter close to the same site for multiple winters. Overwintering sites were almost always in flat, forested sites and were often located close to the edge of a turtle's home range. Overwintering site characteristics included well drained, friable soil; abundant leaf litter cover; close proximity of woody vegetation; and stable, cool ground temperatures.



A typical female Box Turtle home range includes forest, meadow, and wetland habitats.

Sandy Barnett recently retired as senior herpetologist at the National Aquarium. She is also a past president of the Mid Atlantic Turtle and Tortoise Society.

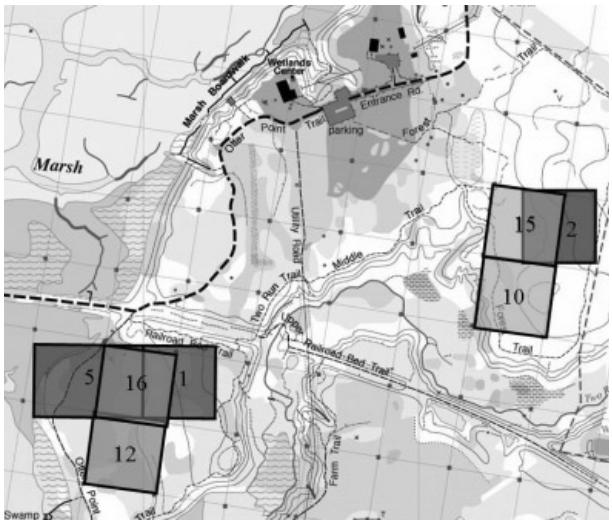
Using Plot Surveys to Assess Eastern Box Turtle Density and Site Fidelity

Mike Quinlan and Chris Swarth

Determining the density, or merely the presence, of Box Turtles in an area can be a challenge for resource agencies that need to make population assessments. Box Turtles are spatially dispersed and cryptically colored, and they can remain immobile for significant periods of time, hidden beneath leaf litter or within dense vegetation. As a result, multiple site surveys may be necessary to accurately document their occurrence and abundance.

In order to measure the density and site fidelity in a population of individually-marked Eastern Box Turtles in the Sanctuary, we conducted 175 plot surveys from 2000 to 2007. Plots measured 100m x 100m (N=11) and were located in a variety of habitats adjacent to the Patuxent River. Surveys in a single plot were made every seven to 14 days, from early May to mid-October. Each survey was conducted by four to nine searchers and took about 45 to 60 minutes to complete.

The mean single-survey density ("instantaneous" density) varied from 1.1 to 4.5 turtles/ha; these are minimal estimates because not all turtles in a plot are observed on a survey. High single counts yielded 8 to 9 turtles/ha, whereas about 15% of surveys yielded no turtles. Up to 29 different turtles were recorded using a single, one hectare plot over the course of several years ("cumulative" density). A high degree of site fidelity was confirmed for males and females. Based on this study, 8 to 10 surveys within the same plot over a season may be required to obtain a reasonable estimate of density.



Plots adjacent to wetlands (Plots 1, 5, 12,16) supported significantly more turtles than plots located in drier upland areas (Plots 2, 10, 15).

Plots adjacent to wetlands supported significantly more turtles than plots that were several hundred meters from wetlands, suggesting that the proximity of water and wetlands are important in determining turtle habitat selection and home range size. Repeated surveys within one hectare plots appear to be an effective method for measuring Box Turtle density and could be a useful tool for assessing population status in selected areas throughout the species' range.

Mike Quinlan has been participating in a variety of research studies at the Sanctuary for over 12 years. He also leads education programs and serves on the Friends of Jug Bay board.

Jug Bay Summer Science Camps

Check out www.jugbay.org for information, directions and updates to our schedule.

Our camps are designed to introduce campers to wetlands, ecology and scientific investigations. During these outdoor, all-day programs, campers explore the natural world and conduct ecological studies through hands-on student-centered activities. Group size is limited, with a staff to camper ratio of 1:5.

Registration Information

- Registration is on a first-come, first serve basis.
- Mail the registration form directly to the Jug Bay Wetlands Sanctuary. You may enroll in person at the Sanctuary on Wed or Sat between 9 am-5 pm. Use the registration form in the county Program Guide or download a form from www.jugbay.org
- Children must be entering the grade specified.
- Registration fee must be paid at time of registration, by check or cash only.
- Camp size is limited. You will be notified of your registration for camp, if a camp is filled, or is rescheduled.
- Full refunds are given only when a class is canceled by JBWS. Full refunds will be given due to illness if the request is made prior to the start of camp and accompanied by written verification from a physician. An 80% refund will be given if you cancel before the scheduled start date. Fees of $5 or less are not refundable.
- Individuals with disabilities will be accommodated if JBWS is given at least 2 weeks notice.
- Participants may be photographed during programs and JBWS and Anne Arundel County may reproduce the photographs

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Reptiles and Amphibians (for children entering 5th or 6th grades in Fall 2008)
Monday, June 23 - Friday, June 27 (9:30 a.m. - 3:30 p.m.)
Snakes, turtles, lizards, frogs, toads and salamanders will be the stars of this program. We'll investigate the differences and similarities between reptiles and amphibians. Each day we will explore a different habitat. We'll search ponds for tadpoles as we learn about the life cycles of frogs, toads and salamanders. A canoe trip, overnight camp-out on Thursday, and a nocturnal Herp Hike are highlights of the camp. Art projects, games and experiments will enhance our daily activities.
Fee: $130 per session ($120 for FOJB members)

R & A CAMP FILLED

Our Blood Runs Cold . . .
(for children entering 7th or 8th grades in Fall 2008)
Monday, July 7 - Friday, July 11 (9:30 a.m. - 3:30 p.m.)
...or so they say. Come discover what it means to be an ectotherm (cold-blooded animal), as we investigate the lives of reptiles, amphibians, fish, insects and spiders. Seining for fish in the marshes and river and exploring the ponds for salamanders and frogs will take us to the habitats where many animals are found. A canoe trip on the Patuxent River will give us a chance to search for Painted Turtles and water snakes. During the Thursday overnight camp-out we'll go on a nighttime search for moths, katydids and spiders (as well as their predators: owls, bats, frogs and toads).
Fee: $130 per session ($120 for FOJB members)

Paddling the Patuxent
(for teens entering 9th through 12th grades in Fall 2008)
Monday, July 28; 9:00 am-4:00 pm
Tuesday, July 29; 9:00 am-Friday, August 1, 3:00 pm
This multi-day canoeing expedition features education programs, riverside camping, restoration projects, festive meals, entertainment and much more. We'll enjoy a unique on-the-water experience that builds a strong environmental ethic, while having a lot of fun in the process. Special programs are offered throughout the trip. Monday will be a day of practicing and refining our canoe techniques, reviewing the week's schedule and team building activities. Tuesday morning we'll meet other groups of teens for a multi-day canoeing and camping journey down the Patuxent River. Canoes, paddles, life vests are provided. Teens provide their own sleeping bags and personal equipment, and can share tents with other campers. Some tents are available to borrow. Many meals are included in the fee. Contact the office for a detailed itinerary of the week and supply list. We welcome suggestions for activities!
Fee: $250 per session ($240 for FOJB members)

Teen Adventure
(Entering at least 9th grade in Fall 2008)
Are you ready for adventure? We have many opportunities for you to become involved in the exciting things happening at Jug Bay. Sign up for one day or many: you will participate in the on-going research projects, interpret data collected, and work on a service project. You can use the hours to fulfill your community service requirements. $5 for the series, no matter how many days you attend (free for volunteers.) Additional dates may be scheduled.
Contact the office in June for complete schedule.
Thursday, July 24; 9:30 am-3:30 pm: Fish Survey
Tuesday, August 5; 9:30 am-3:30 pm: Aquatic Ecology
Thursday, August 21; 9:30 am-3:30 pm: SAV

Spring 2008 Public Programs at Jug Bay

- Reservations and entrance fees are required for all events, unless noted.
- Call 410-741-9330 or e-mail programs@jugbay.org
- Check out www.jugbay.org for information, directions and updates to our schedule.
- Open to the public 9 am-5 pm Wednesday and Saturday.
- Programs are open to families and individuals. An adult must accompany children under 13.
- Scouts and other groups must call to arrange a separate program.
- Please note age limits for each program.

Entrance Fees: Adults $3; Children under 18 $2; Over 60 $2; FOJB family membership $25.

This Great Horned Owl chick, being raised in an old Bald Eagle nest, was photographed by volunteer Bill Miles on April 9.

PLEASE NOTE: The Sanctuary will be closed on Sundays through the end of June

Birding at Jug Bay

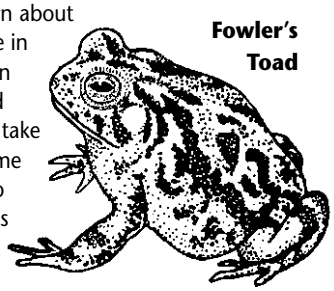
Saturday, May 3; 8:00-11:00 am
Saturday, June 7; 8:00-11:00 am
Saturday, July 5; 8:00-11:00 am
Saturday, August 2; 8:00-11:00 am
Learn the skills of identifying birds by sight and sound. Binoculars and field guides will be available to borrow. Not appropriate for children under 12.

Poplar Island Birding Trip

Thursday, May 22, 9:00 am -1:30 pm
We have a limited number of spaces available for this trip. The boat to Poplar Island departs the Maryland Environmental Service pier on Tilghman Island at 9:00 sharp. Participants will be responsible for their own transportation to the departure point (from the Sanctuary, 79 miles, estimated driving time 1 hour, 41 minutes). Poplar Island, just off the coast of Tilghman Island (Talbot County) in the Chesapeake Bay, is being returned to its former size and important ecological function, while helping to ensure the economic vitality of the region. Shortly after the first dredged material was placed on the island in the spring of 2001, Ospreys, egrets, terns, herons, eagles, terrapins, and other wildlife began to call the island home. As the island's wetlands mature, they will serve as a natural filter and improve water quality and also provide valuable habitat for birds, crabs, fish, and shellfish. Bring water and a snack or lunch. Plan to stop at a nice local crab house on the way home. Directions to departure point will be provided. Pre-registration is mandatory. For teens and adults.

Toad Abodes

Saturday, May 31; 2:00-4:00 pm
Did you know that one little toad can consume up to 1000 insects in just one day? So put down the pesticide and come learn about the many beneficial attributes of our small amphibian friends. You'll learn about the toads that live in this area, and then we'll make a Toad Abode for you to take home and welcome these animals into your yard. All ages welcome.



Fowler's Toad

Home School Programs

Monthly. $3 per program. Family discount: $2 per additional child.

Animal Architecture

Wednesday, May 21; 10:00 am-1:00 pm
Animals are amazing engineers, creating strong, complex structures—from nests to honeycombs to silky webs. We'll go on a hike to find examples of animal architecture, and learn about these structures through games and activities.

Fish

Wednesday, June 11; 10:00 am-2:00 pm
Fish living in the Patuxent River are of all shapes and sizes. Some are migrants, and others live there year-round. We'll wade into the water with a seine net to collect fish, then identify them and learn about their life histories. Please wear old clothes and tie-up shoes (no Crocs) that can get p. 10

Canoeing at the Sanctuary *Fee: $5 per person (including FOJB)*

Paddling the wetlands along the Patuxent provides opportunities to learn about the plants, animals, and history of the area. Experienced volunteers or staff naturalists lead trips. Canoe instruction and all equipment provided. Please bring a lunch and plenty of water. To reserve a space, mail your payment in advance to the Sanctuary. Please note age limits for each trip. Please include your names, address, daytime phone number, number of people in your party and the ages of children.

10,000 years on the Patuxent

Saturday, May 31; 12:00-4:00 pm
The Patuxent River is rich in history, from Indian settlements, colonial towns, war battles, and a 20th century railroad. We will take a short leisurely canoe trip across the river to Mt. Calvert to learn about the archaeology and history of the site. Children must be at least 12 years old.

Discover Wetlands by Canoe

Saturday, June 14; 12:00-4:00 pm
Enjoy a leisurely paddle through the Patuxent River wetlands and open a new window into the natural history of Jug Bay. Children must be at least 7 years old.

Patuxent Paddling Potpourri

Saturday, June 28; 10:00 am-2:00 pm
Come explore the river and see what we can find. We'll observe birds, fish, plants and whatever else happens into our path. Children must be at least 12 years old.

Parris N. Glendening Nature Preserve at Jug Bay

The Glendening Preserve encompasses over 620 acres of tidal marshes, upland forests, stream valleys and open meadows. Come explore these habitats and search for a diversity of plants and animals.

• The Glendening Preserve is open to the public 9 am-5 pm every day except Sunday for hiking. (Closed on Holidays)

• Parking is available daily at the Wrighton Road entrance (closed on Sundays).

• Programs are open to families and individuals - please note age limits for each program. An adult must accompany children under 13.

• Scouts and other groups must call to reserve a separate program designed to meet their interests.

• Reservations are required for all events. Call or email to register, 410-741-9330; programs@jugbay.org. Admission is free.

• Check www.jugbay.org for more information.

• These programs meet at the Plummer House (Plummer Lane entrance).

Herp Search

Saturday, June 7; 10:00 am-3:00 pm

Join our annual reptile and amphibian (a.k.a. herps) research study. This year, we'll search the Preserve's forests, stream banks and marsh edges for turtles, frogs, toads, salamanders, lizards and snakes. Participants will be assigned to teams to help identify and map where the herps are found. Free admission. Children should be at least 8 years old.

Summer Solstice Hike

Friday, June 20; 6:30-8:30 pm

The Summer Solstice marks the longest day of the year and the start of summer. Celebrate the season while hiking the summer woods. We'll end the hike with a light snack. All ages; children should be able to walk up to 3 miles on natural surface trails at a moderate pace. Trails are not easily traveled by strollers.

Streamwalk

Wednesday, July 16; 10:00-noon

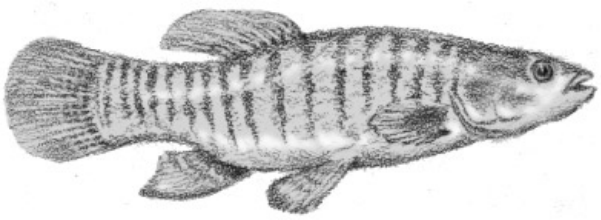
Put on your old sneakers and explore the streams of the Preserve. We'll use dipnets to discover the animals living there. Bring a towel and change of clothes and shoes. No Crocs or open-toed shoes.

Full Moon Hike

Aug. 16, Saturday, 7:00-9:00 pm

The full moon of August is called the Fruit Moon by the Cherokees since this is the time when many wild fruits and berries ripen. Join us for a leisurely stroll through the forest under the light of the full moon. All ages; children should be able to walk up to 3 miles on natural surface trails at a moderate pace. Trails are not easily traveled by strollers.

Volunteer & Research Programs



Fish Survey

Saturday, May 3: 1:00-4:00 pm (Two Run Creek)
Saturday, June 7: noon-3:00 (Galloway Creek, Glendening Preserve)
Saturday, June 14: 1:00-4:00 pm (Patuxent River)
Saturday, August 16: 1:00-4:00 pm (Beaver Pond)

Using a large seine net, we monitor the fish populations living in shallow water and creeks. Volunteers willing to get wet are needed to help catch, identify and measure (and then release) fish. Wear old shoes that tie tightly (not Crocs or sandals) and clothes that can get wet and muddy. Bring a change of clothes, shoes and a towel. Survey will be canceled if it rains. Children must be at least 12 years old. Free admission to the Sanctuary.

Canoeing and Rescue Skills Workshop.

Saturday, May 17, 9:00 am-3:30 pm
Fee: $40, payable in advance to the Friends of Jug Bay. Free for current JBWS canoe volunteers.

A full day of intense flat-water instruction, classroom and rescue sessions. This workshop prepares you for conditions you might expect on open flat water or slowly moving water; lakes, deepwater rivers, and inland bays. Learning basic strokes early translates later into fluid maneuvers later in the day. We have canoes, paddles, life vests (PFD) and other equipment, but if you have it, please bring your own PFD, fitted and sized properly. Plan to be in the water, a wet suit is recommended. No experience needed. Wear footwear for wearing in the water (no Crocs); always dress for weather. Bring a complete change of clothes, warm fleece or rain jacket, and lunch. Class size is limited - advanced registration is required. Adults only.

Naturalist Training:

Birds: Saturday, July 12; 9:00-11:00 am
Herps: (Reptiles & Amphibians) Saturday, July 19; 1:00-3:00 pm
Plants: Saturday, August 9; 10:00 am-noon
Bugs: Saturday, August 23; 10:00 am-noon

Volunteers are needed to lead a variety of weekend programs for families. Each workshop will focus on the basics of the topic and introduce fun and educational activities that can be used in program planning. For adults and older teens.

Special Teacher Training Opportunity

Data and the Estuary *July 14-18, 2008, Tuition: $150*

This 5-day program (with 2 overnights at Chesapeake Bay Foundation's Karen Noonan Center) is designed to provide teachers with the resources, knowledge and experience necessary to facilitate the integration of estuaries and their related issues into the classroom. The program accomplishes this through hands-on field-based investigations carried out in the diverse environments of the Chesapeake Bay National Estuarine Research Reserve. Teachers will have the opportunity to gather authentic data on land use, water quality, biotic communities and other parameters, analyze that data, and ultimately use this information to develop action projects that will have a positive impact on the natural systems of the Chesapeake Bay. This program will help teachers increase their ability to design authentic student-driven investigations; implement Investigations; analyze collected information; and develop action projects to manage and address the results of investigations. Teachers may receive MSDE credit for successful completion of all assignments. This program is supported by a partnership between: NOAA, DNR, JBWS, CBNERR-MD and CBF.

Interpreting Forested Landscapes

Karyn Molines and Lisa Siciliano

Although upland forests are the dominant habitat type within the Sanctuary, comprising 43% (243 of 573 hectares), they are not well studied. In 2003, we initiated the habitat survey to document the species diversity and ecological communities within the upland portions of the Sanctuary.

We divided the Sanctuary into two main sections: the Glendening Nature Preserve (GNP), north of Wrighton Road, and to the south, the Jug Bay Area (JBA). Anecdotal evidence and casual observations indicate that these two forests are different in species composition, abundance and distribution.

We identified and measured the diameter of all trees found within 10m x 10m plots located throughout the upland forests. We also indicated other habitat features such as slope and surface substrate cover, and identified shrubs, vines and herbaceous species within the plot. We summarized the results from 93 plots in GNP and 69 plots in JBA that were surveyed between 2003 and 2005.

To determine if the forests of GNP were older or younger than those at JBA, we mapped the distribution of American beech (*Fagus grandifolia*) and Virginia pine (*Pinus virginiana*)—two species that typically represent mature and young forests, respectively. Species composition defined whether the plots were mature forests (beech present but no pines); young forests, (pines but no beeches); or maturing forests (mix of both species). Within GNP, the plots were 30% mature, 11% young, and 44% maturing. By contrast, JBA was characterized by 64% mature, 4% young, and 15% maturing. Thus, the forests of GNP appear to be younger than the forests at JBA.

Two facultative wetland species, Red Maple (*Acer rubrum*) and Sweet Gum (*Liquidambar styraciflua*), were mapped to determine whether their distribution and abundance indicated habitat moisture regime differences. The distribution of Red Maples and Sweet Gums in GNP were similarly concentrated in the southeast section, which contains large vernal wetlands, and the headwaters of a creek, confirming the moist hydrology of the area. Red Maple and Sweet Gum were more widely distributed and more abundant at JBA, suggesting that these forests may have a higher moisture regime than GNP.

This analysis confirmed that habitat differences can be assessed by comparing the diversity, distribution and abundance of tree species. When combined with GIS data and data from other research studies conducted at the site, the habitat survey can provide further insight into the role that habitat characteristics play in the ecology of Box Turtles, songbirds, or salamanders.

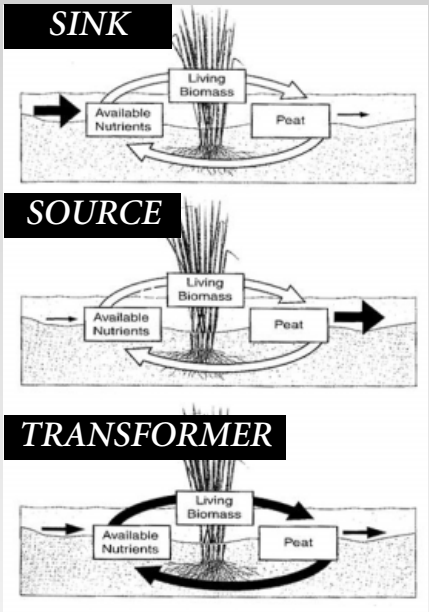
In 2008, we began a preliminary survey of the Riggleman Preserve. We are conducting less formal studies (OK, we're taking walks through the woods!), using our handheld GPS units to map the locations of large trees, interesting habitats, and unusual features. We plan to develop a species list for the Preserve. When the grid system is extended into the Riggleman Preserve, we also plan to conduct the plot survey there.

Lisa Siciliano is a master gardener and scientist. She has been volunteering at Jug Bay for six years.

Water Quality Trends in Jug Bay's Freshwater Wetlands

David Davis and Lindsay Hollister

Water quality is fundamental in determining the health of a wetland ecosystem and can determine the type and quality of plant and animal life in a wetland. We have established a long-term data set by monitoring the water quality at several sites in the Jug Bay Wetlands Sanctuary for the past 20 years. Sites include tidal shallow-water wetlands, the Patuxent River channel, and a non-tidal stream.



Wetlands have an important role in the biogeochemical cycling of nitrogen (See Figure):

- During the growing season the wetlands function as a **nutrient sink**. The emergent and submerged vegetation takes up nutrients from the water and sediments, using them to grow and reproduce, and thus storing nutrients for the season or short term. Long-term storage occurs as plant matter settles to the bottom and is buried.
- In the fall and winter as the wetland plants break down or decompose, they act as a **nutrient source**, releasing nitrogen and phosphorus stored in their seeds, leaves, stems and roots to the water column.

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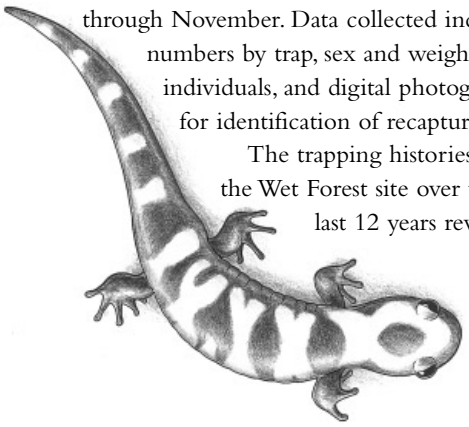
Breeding Migration Patterns of Marbled Salamanders

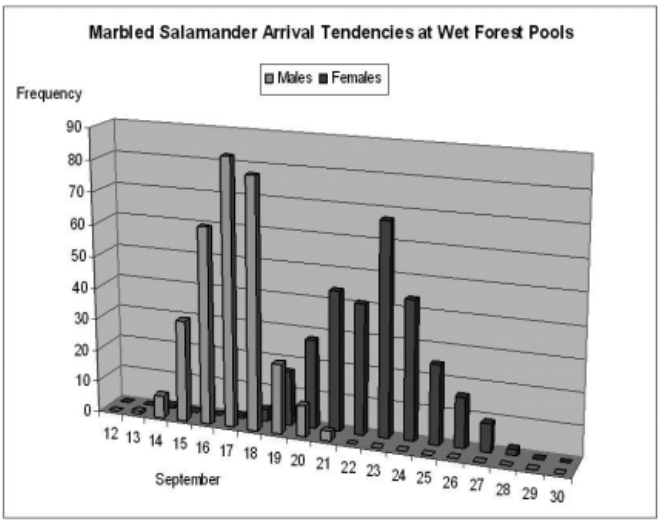
Pete Uimonen & Karyn Molines

Marbled Salamanders (*Ambystoma opacum*) pose some interesting questions in population biology and breeding behavior. Their breeding behavior is unique for salamanders because they breed in fall as opposed to spring. At Jug Bay Wetlands Sanctuary they tend to move to the breeding ponds sometime in mid-September.

Since 1988, staff and volunteers have monitored amphibian breeding locations using drift fences and pit fall traps. Since 1996 we have focused our efforts on Marbled Salamander populations using three breeding sites (Mark's Pond, Forest Bluff, and Wet Forest) for the period from September through November. Data collected include numbers by trap, sex and weight of individuals, and digital photographs for identification of recaptures.



The trapping histories for the Wet Forest site over the last 12 years reveal several patterns. First, males and females tend to begin their significant breeding movements to the vernal pool on separate days in September. Second, regardless of precipitation, no movement is likely prior to September 13th. Third, the first large male movements appear to be more predictable (that is, they occur within a narrower window of days than for the females). Fourth, over the course of the season, males move in significantly larger numbers than females. Marbled Salamanders move in spurts, with the vast majority of total captures each season occurring on just a few nights. Thus, the distribution of number of salamanders caught is highly skewed.



Patterns of association between Marbled Salamander movement and precipitation are not as clear. While precipitation is considered a necessary condition for breeding movements, it is not sufficient. Thus, the presence of the salamanders in the traps indicates precipitation the previous evening. The converse is not as clear cut: if it rains on a given night of the trapping season, trapping success is somewhat less than 50 percent.

Pete Uimonen works as an economist with the US Department of Labor's Bureau of Labor Statistics. He has been volunteering at the Sanctuary since 2002.

Stalking Wild Data: Environmental Informatics at Jug Bay

Jeffrey D. Campbell

There are three aspects to environmental informatics work at Jug Bay. The first is a data warehouse to consolidate data and simplify analysis. The second is geographical information systems (GIS) data. The third component is using data mining tools to discover relationships between abiotic and biotic observations.

There are environmental factors common to many of the research projects at Jug Bay ranging from herpetology to botany to fish to macro invertebrates and birds. We have developed the **Jug Bay Data Warehouse**, which includes information about weather (from four sources), river flow, river water nutrients and other properties, sun/moon rise/set times, lunar phase, and tides. The purpose of the data warehouse is to be common repository for data to allow sharing between projects and to integrate data for further analysis. A simple illustration of the value of the data warehouse is investigating a spike in turbidity at the river pier. Weather data (National Weather Service, MD Dept of Natural Resources and Jug Bay observations) showed heavy rains preceding the turbidity increase. US Geological Survey data showing increase water flow in the river and DNR data showing higher river water levels support the explanation that the heavy rain increased the sediment load in the river.

Impending capture of the once common *Discus ibmus*.

GIS data can be thought of as map data (e.g. roads, building, trails, vegetation types), images (e.g. aerial photographs, infrared images) as well as computed values (e.g. land use, impermeable surfaces, eleva-

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The Least Brook Lamprey *(Lampetra aepyptera)*

By Elaine Friebele

Photo by Cynthia Bravo

When volunteers venture out to survey trees, they never know what other things they might encounter. On March 25, while the habitat survey group was exploring the Riggleman property to mark larger trees with GPS readings, they hiked alongside Pindell Creek, and a single lamprey, about 4 inches long, swimming in a shallow area of the creek caught their eye. What, you might ask, is a lamprey? (There's a vague memory from high school biology class, you say?) Lampreys are primitive, eel-like fish that lack jaws, paired fins, or bone. Adults have a cartilaginous skeleton.

We spotted more than half a dozen gravel-lined depressions with lamprey swimming in them. In one depression five scuttled around each other, occasionally winding themselves into a single, intricate knot.

Least lampreys (*Lampetra aepyptera*) are caught occasionally during fish surveys and by casual netting in the creeks. Had anyone ever witnessed an easily visible lamprey? Never! As we walked along, we spotted more. Often two or more lampreys lay in a shallow depression in the gravel bottom. Occasionally, one would attach its sucker-like mouth to a pebble and, wriggling its body vigorously, stir up sand. According to the Peterson fish guide, lampreys excavate pits to be used as spawning sites. After the eggs are deposited in these depressions, they hatch into blind, worm-like larva that live in the mud at the bottom of pools for three to eight years. These filter-feeding larvae glean algae and particles of decayed biological material from the water. They metamorphose into adults with rasping teeth on the tongue and an oral disc. (Although adult least lamprey never eat, some lamprey species are parasitic on fish, attaching themselves with the sucker-like mouth.) The adults overwinter in the stream, and when the water temperature reaches 10-16°C, they enter riffle areas to spawn, and then die.

The next day, I explored to see whether there were similar goings-on in Two-Run Creek. Sure enough, as many as twelve lampreys undulated in pebbly depressions in the creek riffles! Bending by the water, I watched a lamprey attach its mouth to a pebble and, wiggling its body furiously, move the pebble to a strategic location. Apparently, these little architects build up the sloped sides of their nest depressions.

The fact that the least lamprey requires clean water and is highly sensitive to pollution indicates that both the creeks are in good health.

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• The transformation of nutrients occurs in the sediment. In a conversion process known as **nitrification**, bacteria transform organic nitrogen into soluble nitrate. Converting dissolved nitrogen to nitrogen gas occurs through **denitrification**.

Our data, obtained by sampling the water at high and low tide in the tidal shallow-water wetlands, has shown that the wetlands at Otter Point reduce nitrogen by about 24%, and at South Marsh, by almost 50%. This is consistent with the idea that plants absorb nitrogen as a primary nutrient, and that bacterial activity converts nitrates and nitrites to atmospheric nitrogen, which escapes into the air.

Dave Davis has volunteered at Jug Bay for five years, participating in the Water Quality Study and the Habitat Survey. He is also a member of the Friends of Jug Bay Board.

tion contours). Many such data sets have been obtained for the Sanctuary area. Very high resolution aerial images showing individual trees have been combined with digital elevation models (20 cm vertical resolution) and GPS (global positioning system) data to analyze the extent of the Glendening vernal pool. GIS data showing historical changes the river shoreline have also been examined in relation to the growth of wild rice. Automated analysis has identified watershed boundaries of the smaller streams.

Data mining is a collection of sophisticated, partially automated data analysis techniques to discover and analyze patterns in data. The useful patterns allow for non-trivial predictions. For example, a wide variety of weather parameters could be evaluated to predict Marbled Salamander migration activity or the distance traveled by Box Turtles monitored with radio telemetry. One data mining technique, decision trees could be applied to the data of sex-related characteristics (e.g. Box Turtle, Marbled Salamander) to best determine the sex of animals where the observed traits are inconclusive. Other techniques such as classification and association rules could find relationships between water quality and weather with submerged aquatic vegetation growth or fish and macro invertebrate populations. Clustering techniques can identify similar relationships. Jug Bay applications could include identifying habitat plots with similar species, relationships between abundances of different fish species and identifying recaptured Marbled Salamanders based on their coloration patterns.

Jeff Campbell is a member of the Jug Bay Scientific Advisory Board and a research scientist at the Center for Urban Environmental Research and Education at UMBC.

Jug Bay Wetlands Sanctuary

DEPARTMENT OF RECREATION AND PARKS

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

The marsh is awake

"Ula Pua" for Butterflies

A grove of small trees has been planted at the Glendening Preserve in memory of George "Pete" Petersen of Lothian, who died last July at 83. Pete, a native of Hawaii who moved here 40 years ago, loved wood as he loved the Patuxent, and at the suggestion of his wife, Joan, donations were made in his honor to Maryland's Tree-mendous program, which then provided the plants.

The dogwoods, redbuds, and other species will enclose a garden of shrubs and flowers to attract butterflies being planted by volunteer Dave Perry. Thus, visitors in years to come can enjoy the shade and sunny beauty of a "ulu pua pule-lehua"—Hawaiian for butterfly garden.

Thanks for Your Donations

- **Anna Braum** for a wooden bat box
- **Jeff Campbell**, for creating an attractive, colorful "Fish of Jug Bay" poster
- **Cynthia Bravo** for producing a mammal guide and checklist for the Sanctuary
- **Diane Goebes** for serving as an excellent volunteer naturalist during our staff shortage.
- **Liz Ahmann** for *Brother Eagle, Sister Sky, A Message from Chief Seattle* and *Creepy Crawly Creatures* by C.J.Naden, and the donation of flippers and goggles for a beaver program.
- **Jean** and **Carlton Hershner** for the Time Life Nature Library

We would like to recognize **Jay Tillman**, who volunteered through the summer of 2007, but was accidentally left off the list of active volunteers.

Winter Volunteers

(November 2007 - January 2008)

Susan Blackstone
William Braisted
Cynthia Bravo
Peggy Brooks
Emelia Brumbaugh
Judy Burke
Gordon Burton
Mary Burton
Danny Bystrak
Jeff Campbell
Betty Chaney
Ginger Chaney
David Davis
Mark Delfs
Kim Elliott
Lynette Fullerton
Diane Goebes
Jim Harle
Ami Hazell
Darcy Herman
Lynn Kenny
Elizabeth Kurgansky
Gene Meyer
Bill Miles
Louise Miles
Dave Mozurkewich
Dotty Mumford
Jennifer Muro
Jan Owings
Dave Perry
Willey Persaud
Carol Quinlan
Michael Quinlan
John Reuter
Gordon Reynolds
Sue Ricciardi
Jeff Shenot
Les Silva
Alex Smith
Bob Smith
Al Sutherland
Liz Sutherland
Yuka Tasumi
Mickey Taylor
Sandy Teliak
Emily Thorpe
Al Tucker
Nancy Weber
Bruce Weidele
Bob Williams III
Bill Wilson
Dick Worth
Carol Yang

Thanks to all!