Ecologists stress the importance of biological diversity at all levels of life from micro to macro: variations within the gene pool of the Mountain Dusky Salamander, for example, as well as diversity within the ecosystem that shelters those animals on forested slopes and stream valleys. What regional scientists may realize after the recent Jug Bay Wetlands Sanctuary conference on amphibians, however, is that to understand and protect species of frogs, toads and salamanders, they need to provide their own diversity in research: diversity in techniques, locations, weather conditions, life stages studied and even diversity in the ages, professions and "preferences" of the researchers.

Amphibians inhabit a wide range of environments with very different seasonal and daily conditions, said Dr. Thomas Pauley of Marshall University in Huntington, W.Va., the keynote speaker at the October 25 conference, "Conservation Ecology of the Amphibians of the Mid-Atlantic Region." One salamander that has a larval period of one to eight weeks in West Virginia, for example, has a larval period of one to two weeks in a nearby state. So it's important to study populations locally and in a variety of ways and times, he warned, and "we've got to be careful in extrapolating data" from one place to the next, or from one species to another.

Similar reports came from other speakers at the meeting, which was sponsored by the Sanctuary, the Audubon Naturalist Society and the Calvert County Natural Resources Divi-

Sharon, Mary and Sarah Brewer, three of the amphibian research volunteers at Jug Bay, check a pitfall trap for Marbled Salamanders.

sion and was attended by 85 people from as far away as Massachusetts and Florida. Researchers described the variations they have found between and within species, as they have worked to figure out which species or populations are in trouble, and why. There is "no one reason for all declines" worldwide in amphibian populations, said Don C. Forester of Towson University. In the case of the Maryland-threatened Mountain Chorus Frog, a 1-inch animal that he found breeding only in 10 meters of one roadside ditch in Garrett County (and he surveyed 5,000 road miles to find this population!), possible culprits are land development, road salt and excavation of ditches. In 1996, the entire year's reproductive effort (originally 978 eggs) was lost after a huge rain scored out the ditch and its 600 tadpoles. (In nearby West Virginia, however, the Mountain Chorus Frog is considered the state's most common frog.)

A very different human activity has decimated the Cheat Mountain Salamander and has also affected the Mountain Dusky, Dr. Pauley reported. Clearcutting of forests in West Virginia has "mutilated" the Red Spruce forest that once provided suitable moist habitat for the Cheat Mountain, forcing it to take refuge in the moisture of rock outcrops. "Clearcutting kills salamanders," Dr. Pauley said. "It takes 80 years after the cut ... for the Mountain Dusky to move back in." And even in the protected land of Blackwater Falls State Park in West Virginia, heavy foot traffic has turned a hiking trail to bare dirt—and thereby has created an impassable barrier for the Cheat Mountain Salamander. (The Redback Salamander, a competitor, appears to be more resilient in the face of this challenge.)

It's crucial to include diverse life stages in amphibian research. These animals not only have two basic life stages, aquatic and terrestrial, but many of them also live 20 years or longer, so that scientists who examine only adults will miss early signs of problems in a population. "It's critically important" to study larvae, Dr. Pauley said, even

Continued on page 4
Watching the River Flow

by Chris Swarth

1998 will mark the 10th year of our water quality study. This study serves a dual purpose:

1. We monitor the environmental quality water in the Patuxent River,
2. We describe how the extensive tidal wetlands interact biologically and chemically with river-borne pollutants.

More than 50 volunteers have participated in this long-term investigation, one of few studies of such duration in a freshwater tidal wetland. One hundred and twenty-six times each year (12 times a month for most the year) volunteers travel to three wetland locations, where at low and high tide they collect water samples (See Volunteer Orientations, Page 7.) The water is filtered in the lab to remove plankton and detritus, and then samples are frozen for later transport to the Chesapeake Biological Lab, where they are analyzed for nitrogen concentrations.

The graph below illustrates nitrate concentrations measured at the Observation Blind channel since 1988. The regular annual variation in the graph reflects important biological and chemical processes. Levels are at their lowest in summer for two main reasons. First, summer is the period of rapid growth for wetland plants, which take up nitrate and ammonium during the process of photosynthesis. Second, warm water temperatures encourage denitrification, an anaerobic process by which microbes in the sediments take up nitrate and in the process release harmless nitrogen gas. Nitrate levels rise to a peak in winter because all biochemical processes are greatly reduced when the water temperature is low.

The downward trending line on the graph illustrates the direction of change that we see in the data. Nitrate concentrations are steadily declining—great news for the river and for the Chesapeake Bay. No longer do we record nitrate levels above 150 micromoles per liter, and last winter levels were even below 100.

Another important way we gauge water quality is to look at the concentrations of oxygen gas that are dissolved in water. The following table summarizes O₂ levels (reported in percent saturation) for the past six months. Levels above 100 percent reflect high rates of photosynthesis by plants (mostly free-floating and benthic plankton) and can be indicative of an algae bloom. Concentrations below 80 percent indicate microbial decomposition and denitrification. Levels below 80 percent are typical of warm, over-enriched or eutrophic waters, conditions that are exacerbated in summer during low tide periods. High tide oxygen levels are usually higher than low tide levels because at this time oxygen-enriched waters are flooding the marsh and diluting the waters that have become depleted of oxygen during the low tide period. The levels displayed at left are typical of our marsh in the summer and fall.

| Percent Saturation of Dissolved Oxygen (Summer and Fall 1997) |
|--------------------|--------|--------|
| Day of Sampling    | High Tide | Low Tide |
| June 1             | 115     | 51     |
| June 15            | 79      | 30     |
| July 12            | 82      | 52     |
| July 26            | 68      | 37     |
| August 9           | 56      | 168    |
| August 23          | 62      | 47     |
| September 13       | 162     | 72     |
| September 27       | 140     | 110    |
| October 12         | 135     | 45     |
| October 26         | 66      | 22     |
Dear Friends,

Unless I am very mistaken we have had a long, lingering autumn that has been more colorful than anyone anticipated, given the 30-year drought that Maryland experienced during the summer. We have been very, very lucky to have had a fall that extended so long into October and gave the amphibian conference—which was a great success—a autumnal ambiance.

In addition to having a full roster of speakers and a full house of pre-registered participants, the conference drew many people wishing to attend on an ad hoc basis. It seems as if the pre-conference, published publicity and word of mouth made this a desirable event at which to be present. The Jug Bay staff and Friends want the Sanctuary to have an annual, October scientific conference, and Friends membership dues go a long way to making such projects possible. This is the kind of thing for which Jug Bay could become famous!

Incredibly, there are very few facilities in the area that combine an environment of scientific integrity with folksy charm and aesthetic beauty, where people can get together comfortably for important scientific meetings. Although at the moment our conference space is limited, the potential is remarkable.

The value and possibilities of Jug Bay were quickly seized upon by two friends of mine who cared to visit in October. Gary Archer is an Australian forester who specializes in Geographic Information Systems (GIS), and his wife, Julia, is a geographer. Currently they are living in Pakistan, where Gary is helping to revitalize the country’s forest conservation program while Julia teaches. They were entranced by Jug Bay the moment they entered our grounds and spent many hours out of a tight schedule absorbing Jug Bay methodology. Gary felt that Jug Bay was the perfect nucleus for a larger, Chesapeake Bay region GIS study. Julia paid close attention to the teaching programs offered at the Sanctuary, especially the format for the new Interactive Wetlands Education Project. She went away wondering how she could incorporate some of these ideas into her own attempts at teaching ecology to children in the city of Peshawar near the Afghan border, and in the far northern, mountainous region of Hunza, near the Chinese border.

Their visit reminded me of an incident two years ago when a friend of mine from England, a professor of auditing and business management, spent a summer’s day with me in a canoe. He had never been in one before, didn’t even like water, and was kind of indifferent to ecology. But Jug Bay worked its magic on him, too. Within a year he had published in a prestigious British journal a paper on the concept of managing environmental health through auditing, and he is now committed to promoting wetlands issues in the UK.

Sometimes, because we are so close to something, we do not realize its value and even become nonchalant. Visits by friends and conferences attended by friends we don’t know yet (to borrow a Will Rogersism) remind us that at Jug Bay we are on to something pretty good.

Winter sees a bit of a hiatus in Jug Bay’s activities, but it is still a good time of the year to familiarize ourselves with areas that in summer are thick with Cattail, Arrow Arum, Spatterdock, Tearthumb and Wild Rice. The new boardwalk, a marvel of construction and dedication, is ideal for this. When you get a chance this winter, bundle up, come on out, and take a look around!

Doug
though they are difficult to identify by species. And he urged fellow field workers to "get down on your hands and knees" to search the leaf litter for young salamanders: "That's the only way to find juveniles" on land. In the water, he recommended using "juvenile refugia bags": filling netting with rocks and leaves, tying it tightly and setting it in the water. Juveniles will hide in the netting to escape predation.

John Zyla of Calvert County Natural Resources Division agreed that juveniles are easy to miss. Marbled Salamanders at his Flag Pond site on the Chesapeake Bay metamorphosed en masse: He and his volunteer corps of schoolchildren found 105 on one day in the first week of June, and none after that, as they "all left the swamp on the first day."

The 12 studies discussed at the conference used a diversity of techniques, with different strengths and weaknesses. Scott Smith of the Maryland Department of Natural Resources surveyed frogs and toads along 34 roadside routes by listening for their breeding calls on warm, humid evenings in spring and summer. He used the help of 42 volunteers (many of whom attended the conference), and chose secondary roads used for breeding bird surveys. This method found 16 of the 20 known anurans in Maryland and perhaps was able to pick up ephemeral wetlands that other surveys would have missed. However, some of the species seemed underrepresented. In the case of the Pickerel Frog and the Northern Cricket Frog, the observers may have had difficulty hearing the calls from the road, he concluded. In the case of the Wood Frog, an "explosive breeder" that mates in the rains of February, the study probably started too late, in March.

William Bridgeland and Chris Athanas utilized many methods for their surveys of two National Park Service sites on the Anacostia River and one on the Potomac: pitfall traps, aural searches, visual "encounters" (looking under logs, litter, etc.) and targeted searches (looking for egg masses). They found 11 species, but many likely species were missing, including the Wood Frog and the Northern Cricket Frog. This leaves park managers with challenging questions: Should they improve the habitat? Create new habitat? Introduce Wood Frogs and Cricket Frogs from another area?

Heidi Bell of the Environmental Protection Agency studies amphibians as a laboratory toxicologist, investigating deformities that are causing concern about environmental pollution. Such malformations—eyes inside of throats, eight legs instead of four, twisted internal structures—have appeared in the limbs and structures of 12 species in 10 states and two Canadian provinces. Possible causes include chemical pollution, ultraviolet radiation, parasites and viral or bacterial infections. Heidi asked conferencegoers to watch for deformities and spread the word about the national reporting center for such findings.

In trying to understand the ecology of amphibians, speakers stressed the importance of collecting a wide range of environmental data, such as temperature of air, water and soil (down to 3 cm), slope, water acidity, magnitude of the stream, litter moisture, litter mass, type and percentage of forest canopy and amount of rainfall. Karyn Molines and Chris Swarth reported that rain was essential for the fall migration movements of Marbled Salamanders at Jug Bay. "But we've had movements with only 1 millimeter of rain, so it's not how much rain," Karyn said.

Eugene Meyer of Loyola College praised a final type of diversity that is sometimes criticized in field work: differences in the human observers. He cited a survey in which he found many frog species but was blind to the big predator, a large snapping turtle. His companion, on the other hand, overlooked several of the frogs but spotted the snapper easily, because his eyes instantly interpreted "a bit of shell" as a turtle's back. The differences between the two sets of human eyes were essential for drawing a detailed picture of the animal life in that pond and its environs. What's the conclusion? "Get that word bias' out of your mind," Eugene urged. "These [differences] are observer preferences. They are helpful ... the same way differences in techniques are helpful."

The conference itself was a shining example of diversity, bringing together people and professions that might otherwise rarely meet, and creating working friendships that will be a rich resource for future studies. As Scott Smith said, "It was a real good mix of scientists, professional resource agency people, consultants and amateur herpetologists. There were so many neat people there that it was certainly worthwhile."

The Friends of Jug Bay supplied funding to support the conference.

Photos of Sanctuary Win Awards from County

In a contest sponsored by the Anne Arundel County Recreation and Parks Department, Brock Snowden, 26, of Crownsville won first place in the Scenic and Nature categories for two photographs he took at Jug Bay Wetlands Sanctuary. David Smaldone, a Jug Bay volunteer who is now in graduate school in Idaho, won an honorable mention for his photograph of a toad.

The contest showcased 11 parks in the Special Facilities Division. All winning photos will be on display at Jug Bay in December.
Jug Bay Wetlands Sanctuary
WINTER PROGRAMS: JANUARY - APRIL 1998

Reservations are required for all events. Call 410-741-9330. Space is limited for all programs. Open Wednesdays and Saturdays 9 a.m. - 5 p.m. December through February (Open Sundays, too, in March). Admission: $2.50 for adults, $2.00 for senior citizens, and $1.50 for children under 18.

**DISCOVERY PROGRAMS**

**Marsh Boardwalk Tour**
December 13, January 10, February 14, March 8 and April 11
Scheduled for the second weekend of every month from 1 p.m. to 2 p.m. Join us for an informal introduction to the ecology of freshwater tidal wetlands. The marshes are ever-changing, so each month offers something new to experience. All ages.

**Morning Birdwalks**
January 3, February 7, March 7 & April 4
Amateur bird watchers are welcome to join us on the first Saturday of every month, from 9 a.m. to 10:30 a.m. Learn the skills of identifying birds by sight and sound. Binoculars and field guides will be available to borrow. Not appropriate for children under 10.

**Animal Tracks**
Saturday, January 24; 10 a.m. - Noon
Animal tracks are easy to find if you know where to look and what to look for. We’ll search the field, forest and marsh for signs of deer, muskrat, beaver and other animals. All ages.

**Winter Walk**
Saturday, February 28; 10 a.m. - Noon
Grab your hat and mittens, and we’ll find beauty in the stark winter woods. Then we’ll warm up with a cup of hot chocolate. All ages.

**Pond and Stream Exploration**
Sunday, March 22; 1 p.m.- 3 p.m.
Come explore our stream and pond. We’ll search out and learn to identify frogs, turtles, fish, tadpoles, and dragonflies and other aquatic insects. Dip nets, buckets, and field guides provided. Wear boots or shoes with laces that can get wet and bring a change of clothes and a towel. All ages.

**Signs of Spring**
Sunday, March 29; 10 a.m. - Noon
Spring is bursting out all over! Come explore the marsh, fields and forests of Jug Bay for signs of animals and plants awakening from the long winter. Dress for the weather, and wear waterproof boots or shoes. All ages.

**Reptiles and Amphibians**
Saturday, April 25; 2 p.m. - 4 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. Learn what it means to be cold-blooded as we search the ponds for basking turtles. Catching newly hatched tadpoles will teach us about the life cycles of frogs, toads, and salamanders. All ages.

**Identification of Frogs and Toads by Sight and Sound**
Saturday, April 4; 5:30 p.m. - 8 p.m.
April showers bring May flowers, as well as initiate an annual mating ritual. Male frogs and toads sing to females in peeps, snores, trills and quacks. Forget the “ribbit, ribbit” and learn that “could drown, better go round” is more appropriate for frog calls. Karyn Molines will review both visual and vocal amphibian identification techniques and discuss amphibian biology. We’ll head out to the ponds to test our skills as we search for Spring Peepers, Pickerel Frogs, Wood Frogs, American and Fowler’s toads and Spotted Salamanders. No children under 10 years old (they can enjoy the family-oriented program on April 25).

**LECTURES IN THE FIELD**

**Aquatic Insect Ecology**
Friday, January 9; 9 a.m. - Noon
Leader: Karyn Molines
Bundle up and come explore a stream! Winter is the best time to study and identify the benthic insects and crustaceans that inhabit streams and marshes. We will learn how to differentiate between the larvae of mayflies, stoneflies, caddisflies, true flies, and other stream invertebrates. The role of invertebrates in monitoring stream health will be discussed.

**Learning to Identify Waterbirds**
Saturday, January 17; 9 a.m. - Noon
Leader: Chris Swarth
Black Ducks, Herring Gulls, Bald Eagles, herons and snipe are just a few of the more than 25 waterbird species that make their winter home on Jug Bay. We’ll search a variety of habitats in order to observe and identify as many species as possible. Bring binoculars and a field guide.

**Special Events**

**Marsh Clean-up**
Saturday, March 14; 10 a.m. - 3 p.m.
Volunteers will pick up trash that has floated into the marsh. This is an excellent opportunity to learn more about our wetlands while helping the wildlife and plants that depend on them. Scout troops and community groups are encouraged to participate. Please dress in work clothes (long sleeves and long pants), including boots or shoes with shoelaces that can get wet and muddy, and bring work gloves, a bag lunch, a change of clothes and a towel. Free admission to the Sanctuary for all who help. All ages.

**Celebrate Earth Day at Quiet Waters Park**
Saturday, April 18; 10 a.m. - 5 p.m.
Music, children’s crafts and kayak demonstrations will make this day one of fun as well as learning, as the Anne Arundel County Recreation and Parks Department holds its annual party to celebrate the diverse environments of Earth. We are looking for volunteers to help Jug Bay Wetlands Sanctuary participate with live animal exhibits and displays about wetlands ecology.
Snapshots of the Board of Friends of Jug Bay

When the moon rises over the marsh, a careful naturalist can catch a glimpse of the park's creatures of the night—the Board of Directors of the Friends of Jug Bay. This crew gathers on Tuesday evenings every other month for the exchange of ideas and decisions on the raising and spending of money to support the park. Even some longtime members and volunteers have never met the board members, or know little about them, so here are quick biographical sketches.

Doug Kuzmiak, the president, is an anthropologist by training and a former journalist who now writes and photographs about conservation issues. He is the North American director of the H.B.H. Foundation, a nonprofit group in northern Pakistan dedicated to improving public health and environmental awareness there. He lives in Timonium with his wife, Humaira Khan.

Suzanne Gubbings, vice president, has been the manager of the Wild Bird Center in Annapolis for five years and is a free-lance educator, after years of working as a riding instructor. She belongs to the Annapolis Rowing Club, and she lives in North Beach with her husband, Gary, and their cat.

Betty Chaney, the secretary, has been on the board for 11 years, eight years as secretary. She is also secretary of the Silver Triangle (Ruritan) Club and a 4-H judge and serves on the Mayo Elementary School Citizens Advisory Council. She lives in Davidsonville with her daughter, Ginger.

Susan Barber, the treasurer, has worked in accounting for many years. She currently works for a local marina and is an active volunteer in schools. She lives in Rose Haven on Herring Bay with her husband, Doug, two children and many animals.

Susan Blackstone worked as a virologist studying water-borne viruses after earning her Ph.D. She left that Army work but has been a water chemistry volunteer at Jug Bay for 10 years. She lives in Edgewater with her husband, Mike, and daughter.

Sharon Brewer joined the board this year after several years as a volunteer. Until recently, she worked part time as a biochemist at the Naval Medical Research Lab. She home-schools her daughters and is a singer with a group called Emili's Fling, which performed at the Jug Bay Music Mix. She lives in Dunkirk with her family.

Peggy Brosnan teaches science in high school in Prince George's County. She is an avid outdoorswoman. She lives in North Beach with another volunteer, Dave Linthicum.

Catherine Cronin is a lawyer who lives and practices in Annapolis. She has volunteered in Jug Bay's canoe and water testing programs since 1993. She also is a dedicated piano player.

Jim Harle, 54, has been on the board since it started. He is a computer specialist at the Naval Academy, where he has worked for 27 years. He sings bass with the Annapolis Chorale and is active in the First Lutheran Church in Sunderland.

He lives in Fairhaven with his wife, Ardith.

Bob LaPorte came to Jug Bay in 1990. He is retired from working in chemical plant construction. He is active in the Annapolis Power Squadron, which teaches navigation, engine maintenance and boating safety. He lives in Severna Park with his wife, Lillian.

Dotty Mumford has been on the board since 1989 and a volunteer since 1985. She is sanctuary chairman for the Maryland Ornithological Society and serves on the Recreation Advisory Board for the county Department of Recreation and Parks. She lives in Annapolis.

Tom Petska, 49, is a senior manager and statistician at the Internal Revenue Service, where he has worked for 16 years. Before his son went to college, he coached basketball and baseball for many years. He lives in Deale with his wife, Barbara.

Ken Riggelman, 44, works for Chevy Chase Bank in Virginia as a loan officer. He also grows grapes and makes wine at his family's property on Jug Bay, called the Jug Bay Farm. As a member of the Bristol Civic Association, he became involved with what is now the Sanctuary during the fight in the 1970s over the proposed rezoning of the property for a trailer court.

Bud Taylor, born in 1931 as John W. Taylor, is an artist famous for wildlife depictions. A resident of Edgewater, he has been taking walks at Jug Bay since long before it became a park. His second book of paintings, "Chesapeake Spring," will be published next year. He served this year on the citizen's board planning the new Beverly-Triton park.
Volunteer Orientations

Water Chemistry and Nutrient Dynamics
Saturday, January 24; 1 p.m. - 4 p.m.
Since 1988, volunteers have monitored nutrient pollution, dissolved oxygen levels, pH and water clarity in Jug Bay's waters. At this workshop we will introduce new volunteers to the study, refresh experienced volunteers' skills and discuss the results of our research. The session is required for all new and experienced volunteers. Water sampling takes place twice a month from March through October, and monthly between November and February.

Spotted Salamander Study
Saturday, January 31; 9:30 a.m. - 12 noon
Volunteers are welcome to learn about the biannual amphibian research that will begin in early February. Volunteers monitor three sets of drift fence/pitfall traps between 8 a.m. and 10 a.m. each day. We will review identification and sexing of different amphibians, discuss protocol and data-recording procedures, and practice utilizing "Spot Pattern Recognition" for identifying individual Spotted Salamanders. We'll also prepare the trapping sites for the upcoming season. The study season begins February 1 and continues until mid-May.

General Volunteer Orientation
Saturday, February 21; 3 p.m. - 5 p.m.
This slide-show orientation will describe the natural history, ecology and environmental history of the Jug Bay area as well as the many volunteer opportunities available. Cider and cookies will be served.

Canoe Guide Training
Saturday, March 21; 10 a.m. - 3 p.m.
Volunteers make it possible for us to meet the increasing demand for the "Marsh Ecology by Canoe" programs. This workshop will cover basic marsh ecology, canoe safety, paddling techniques and canoe routes and will provide an overview of Sanctuary policies. New volunteers are required to attend, as well as participating in at least one canoe trip as a leader-in-training. Much of the training will take place in canoes on the river, so dress for the weather and bring a lunch. At least twice a month from April to October, canoe explorations are offered to public and to organized groups; volunteers will be able to sign up for the leader and leader-in-training positions at the workshop.

Naturalist Training
Saturday, April 11; 9:30 a.m. - Noon
Volunteers are needed to lead our monthly bird walks, boardwalk tours and pond-and-stream explorations. Here's your chance to learn some of the tricks of the trade. We will explore a stream and pond to see how much fun learning can be. We will also review how to lead a trip that is meaningful to all the participants, no matter what their knowledge levels. Plant and animal identification will be part of the workshop.

Welcome to New Staff Members

We are pleased that Doug Willis and Tracey Smith have joined the sanctuary staff. Doug has taken over the position of maintenance supervisor. His extensive background in landscaping, the building trades, nursery management and aquaculture complement his enthusiasm and creative ideas. Doug lives in Churston, where he enjoys beekeeping and photography.

Tracey is our new administrative assistant. She worked for the Navy for over a decade as purchasing agent, public affairs specialist and secretary, primarily with the Naval Research Lab in Washington. She brings a wealth of relevant experience to her new job and a keen eye for office organization. Tracey lives in Chesapeake Beach with her husband, Joe, and their young daughter.

Join the Friends of Jug Bay

Fall Volunteers

Cheryl Adams
Susan Barber
Marty Barron
Chrissy Blackstone
Susan Blackstone
Alan Bourdat
June Bourdat
Morgan Bourdat
Mary Brewer
Sarah Brewer
Sharon Brewer
Annette Bristol
Peggy Brosnan
Bradley Buck
Danny Bystrak
Patricia Cecil
Betty Chamey
Ginger Chaney
Liz Clicker
Columbia Union College
Midge Coppersmith
Cathy Cronin
Sandy Curry
Sam Droge
Adam Duke
Dennis Duke
Evon Duke
David Flutsch
Robert Frezza
Yvonne Goad
Marie Grant
Suzanne Gubbings
Jean Hershner
Deborah Hopkins
Mary Horne
Kim Hudyma
Carol Hughes
Humaira Khan
Susan Kirshner
Tony Klagenberg
Jennifer Kuziauskis
Doug Kuzmiak
Bob LaPorte
Bill Lauffer
David Laughlin
Richard Mike Leasure
Greg Lemmon
Rebecca Lennan
Lloyd Lewis
Kelly Lion
Rick Malagren
Woody Martin
Bill Miles
Dotty Mumford
Val Murdock
Tom Nappi
Shelly Nixon
Keri O'Neill
Renee Ourston
Dave Perry
Doris Peters
Tom Petska
Beryl Pierce
Carolyn Quinlan
Mike Quinlan
Gemma Radko
Rogard Ross
Jill Russ
Diane Ruth
Kristen Scott
Deborah Skovron
Diana Smith
Kelly Starinchak
Bill Steiner
Joyce Snedberg
Rod Snedberg
Dana Swarth
Evan Swarth
Kathy Sloanez
Bud Taylor
Wes Taylor
Alisa Vurgich
Robert Wiesner
Jim Wicks

Donations

We thank the following people for their donations, which will be displayed in the Visitor Center.

Elaine Friebel, for two color photographs she took at the Sanctuary, "Sunset" and "Pink Lady Slipper."

Brock Snowden, for his black-and-white photograph, "Two-Run Creek."
Nature Observations Box: Lions and Leopards and Rhinoceros at Jug Bay? Oh, My!!!

By Liz Clickner

Yes, that’s true! And they have all been seen sometime between August and October of this year! That is, Ant Lions, Leopard Frogs and Rhinoceros Beetles. They live here, and someone jotted these discoveries on our “Nature Sightings” clipboard outside the Visitor Center.

Other observations watchful eyes have caught are Cranefly Orchid and Pink Turtlehead flowers in bloom, the Imperial Moth, Longhorn Beetle and Question Mark Butterflies. Bird sightings include Yellow-billed Cuckoo, several different warblers, Green Heron, Great Horned Owls and Northern Harriers.

Noting seasonal events from year to year is a wonderful way to document shifts and changes in the wetlands. For example, the first signs of Wild Rice and Witch Hazel blooms were again documented in August and September, respectively.

While Wild Turkey and Bald Eagles always thrill us when we catch even a brief glimpse (as some have this summer and fall), many events are taken for granted and never make it to the observation sheets. Can you imagine what late summer would be like without the almost deafening chorus of crickets and grasshoppers or the colorful parade of woolly bears? The observation sheets are a place to note both the common and not so common events that occur at Jug Bay—a way to share the excitement of the endless unfolding of natural history.

Below are many of the observations people noted in late summer and autumn.

<table>
<thead>
<tr>
<th>OBSERVATION</th>
<th>DATE</th>
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<tbody>
<tr>
<td>Crane-fly Orchid in bloom</td>
<td>16-Aug.</td>
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<tr>
<td>Witch Hazel blooming</td>
<td>30-Sept.</td>
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<tr>
<td>Rhinoceros Beetle</td>
<td>4-Sept.</td>
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<tr>
<td>Question Mark Butterfly</td>
<td>5-Oct.</td>
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<tr>
<td>Ant Lion</td>
<td>15-Oct.</td>
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<tr>
<td>Mink and possible tracks</td>
<td>5-Aug., 5-Oct.</td>
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<tr>
<td>Fox</td>
<td>24-Aug.</td>
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<tr>
<td>Blue-winged Warbler</td>
<td>21-Aug.</td>
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<tr>
<td>Worm-eating Warbler</td>
<td>21-Aug.</td>
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<tr>
<td>Blue-winged Teal (3)</td>
<td>21-Aug.</td>
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<tr>
<td>White-eyed Vireo</td>
<td>31-Aug.</td>
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<tr>
<td>Wild Turkey (14)</td>
<td>6-Sept., 27-Sept.</td>
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<tr>
<td>Northern Harrier</td>
<td>6-Sept.</td>
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<tr>
<td>Great-horned Owl (2)</td>
<td>8-Sept.</td>
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<tr>
<td>Yellow-billed Cuckoo</td>
<td>21-Sept., 11-Oct.</td>
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<tr>
<td>Common Snipe</td>
<td>28-Sept.</td>
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<tr>
<td>Northern Water Snake (3)</td>
<td>23-Aug.</td>
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<tr>
<td>Hognose Snake</td>
<td>7-Sept.</td>
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<tr>
<td>Spadefoot Toad</td>
<td>28-Sept.</td>
</tr>
<tr>
<td>Rough Green Snake</td>
<td>27-Sept.</td>
</tr>
</tbody>
</table>