

# 2011 Jug Bay Stream Blitz Report

## Technical Report of Jug Bay Wetlands Sanctuary



# 2011 Jug Bay Stream Blitz

## Introduction

A large variety of aquatic and terrestrial organisms live in the luxuriant habitats of stream valleys and floodplains. Stream valleys often serve as migration corridors, especially where development has fragmented forests and other home range areas. Many animals seek moist floodplain habitats in the dry summer months. It is here in the floodplain that the life cycles of many organisms link the aquatic and terrestrial ecosystems.

Three coastal plain streams flow through the Jug Bay Wetlands Sanctuary: Galloway Creek, Two Run Branch and Pindell Branch. On 18 June 2011, we held a "Stream Blitz" in the three stream valleys within the Sanctuary. The Stream Blitz was fashioned after a BioBlitz, a 24-hour field survey and inventory of organisms in a defined area. Staff and volunteers conducted surveys beginning at 7:00 am and ending at 10:00 pm.

The goals of the Stream Blitz were: (1) to catalogue as many species associated with the streams as possible in a 15 hour period, (2) to compare the stream communities, taking into account differences in floodplain habitat and watershed land use patterns (3) to introduce newcomers to the streams and to our Stream Watershed Study, begun in 2009, in the hope that they might become regular volunteers.

## Sanctuary Location and Habitats

The Jug Bay Wetlands Sanctuary is a 1600 acre ecological research station and environmental education center located in southern Anne Arundel County on the Patuxent River estuary. The Sanctuary is operated by the county's Recreation and Parks Department and is part of the Chesapeake Bay National Estuarine Research Reserve in Maryland. The Sanctuary is about 18 miles south of Annapolis and about 15 miles east of Washington, DC. The McCann Wetlands Center, near the middle of the Sanctuary, is located at 38 ° 47'01" N 76 ° 42'06" W.

## The Stream Watersheds

The three stream watersheds vary in size: Galloway Creek watershed is nearly three times the size of Pindell Creek watershed (See Figures 1 and 2). Although the streams flow through the Sanctuary and empty into the Patuxent River, their headwaters lie beyond this publicly owned, protected land. Human activities upstream in the watersheds can contribute to habitat degradation and reduced water quality. Galloway Creek watershed is home to over 1,000 people, with both commercial and residential development, and a higher percentage of roads and impervious surface (5.3%). Effluent from a small wastewater treatment plant in a residential development flows into Galloway Creek upstream of the Sanctuary. By contrast, the Two Run and Pindell watersheds are more sparsely populated. Forests cover approximately two-thirds of each watershed area.



Figure 1. Map of watersheds of three streams flowing through Jug Bay Wetlands Sanctuary.

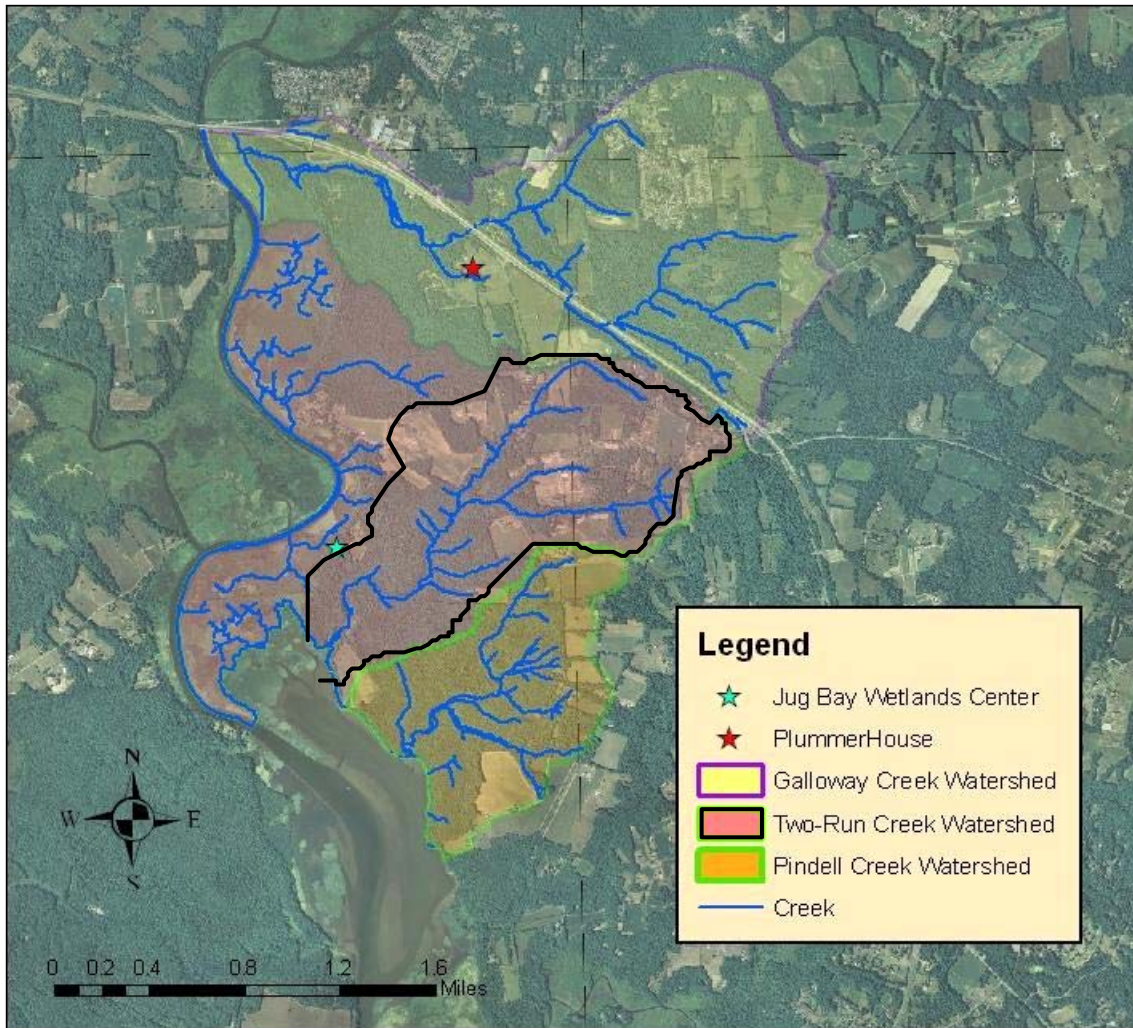
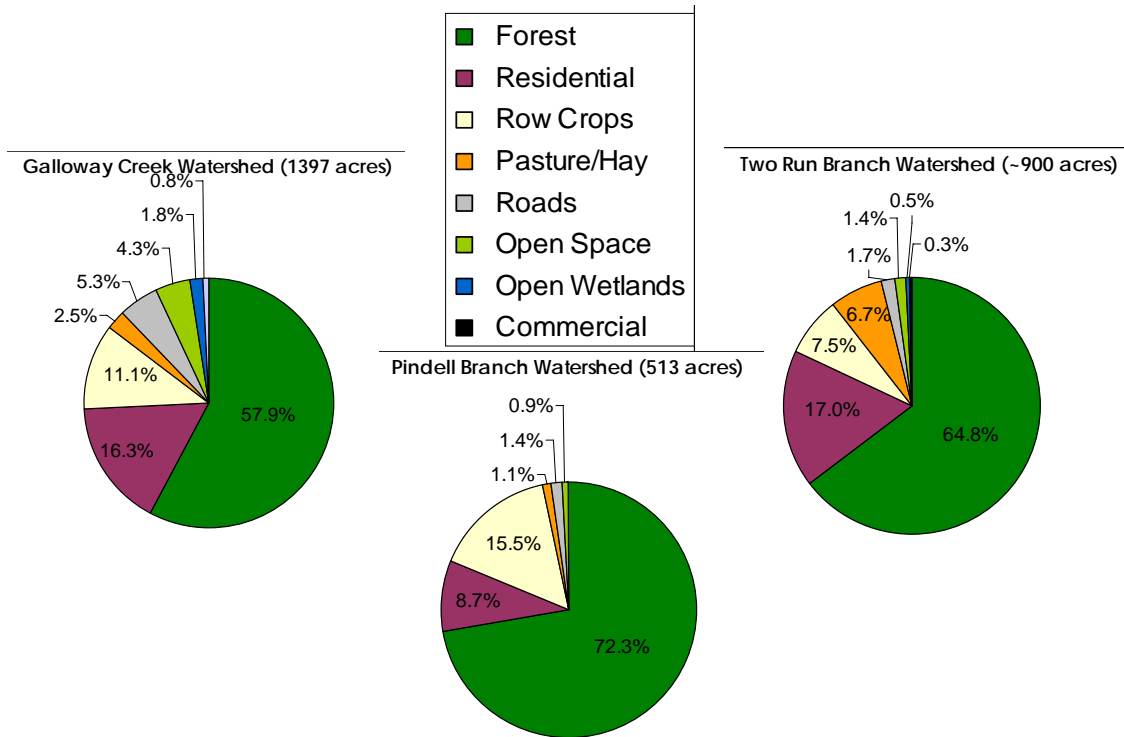


Figure 2. Land Use within Two Run, Galloway, and Pindell Creek watersheds.

# Watershed Comparison: Land Use



## Methods

Volunteers were organized into six search teams: Riparian Birds, Macroinvertebrates, Fish and Crayfish, Riparian Plants, Reptiles and Amphibians, and nocturnal calling animals (Frogs, Toads and Birds).

### Water Quality

Parameters were measured at 9:00 am, before in-stream sample collection or surveys were begun, at two established (“upstream” and “downstream”) monitoring sites in each creek. Participants used a YSI DO Meter to measure dissolved oxygen, pH, and temperature. Water samples were collected for TSS, filtered, frozen, and transported to Chesapeake Biological Laboratory for analysis. A Secchi tube was used to measure turbidity.

### Macroinvertebrates

Volunteers conducted macroinvertebrate surveys at previously established sites, following MBSS protocols.

### Fish

DNR staff captured fish in Galloway and Two Run Creeks via electroshocking and followed MBSS guidelines. Because of time and personnel constraints, fish sampling was conducted using only nets in Pindell Creek.

### Birds

Participants conducted 5-minute point counts of riparian bird observations and calls beginning at 7:00 am, moving upstream from the mouth through five to six predetermined sections of the stream valleys. Birds were counted in only two of the five designated Two Run stream sections. Effort: 3 observers per stream; time approximately 1 hour.

### Herps

Working upstream, teams conducted searches for amphibians and reptiles. Effort: 5 – 6 observers per stream; time approximately 3 hours. Volunteers traveling upstream through designated stream sections conducted calling surveys from 9:00 – 10:00 pm.

### Riparian Vegetation

Vegetation was surveyed in the Pindell Creek floodplain only.

## Acknowledgements

Thirty one observers participated in the Stream Blitz. We are especially grateful to Rebecca Bourquin and Sara Weglein, Department of Natural Resources Fisheries, who conducted electroshocking in Galloway and Two Run Creeks.

**Team Leaders:** Stan Arnold, Sue Ricciardi, Sandy Teliak, Chris Swarth (Birds); Rebecca Bourquin and Sara Weglein (DNR), Eric Duce, Lindsay Hollister (Fish); Mike Quinlan, Robert and Rosemary Frezza, Chris Swarth (Herps); Jeff Campbell, Samantha Dean, Holly Baden, Holly Fallica, Chris Swarth (Nocturnal Calling); Elaine Friebele, Mary Stuart Sierra (Riparian Plants)

**Participants:** Tere Barano, Mary and Gordon Burton, Eric and Susan Carlson, Marinda Durkee, Tyler Easterday, Kim Elliot, Danielle Franklin, Darcy Herman, Ben Hollister, Arlene Karesh, Kyle Maduro Suzanne Plympton, Will Saffell, Jeff Shenot, Pete Uimonen

## Stream Blitz Results

### Weather Data

|                      |            |
|----------------------|------------|
| Maximum Temperature: | 89.5° C    |
| Minimum Temperature: | 63.8° C    |
| Humidity:            | 84.3%      |
| Barometer:           | 29.9 mm Hg |
| Precipitation:       | 0.01 in    |

### Water Quality

Water chemistry data collected at the beginning of the day is presented in Table 1. The data shows that:

- Parameters measured in Pindell Creek indicate good water quality. The streams had sufficient dissolved oxygen and clarity (DO was not measured at Two Run, possibly because of equipment availability).
- Total suspended solid levels were high in downstream sampling sites of Two Run and Galloway. (Two Run's downstream site is below the outfall of a beaver pond)
- Two Run Creek was slightly acidic; phosphate concentrations at the upstream sampling site were almost twice desirable levels.
- Galloway Creek contained elevated nitrate and phosphate concentrations—which likely result from wastewater treatment effluent upstream.

**Table 1. Water Chemistry Data, June 18, 2011**

U= Upstream sampling site; D=Downstream sampling site; Highlighted values exceed ideal range

| Site               | Reach | Water Temp | DO             | pH           | Secchi Depth     | NH4    | NO23           | PO4             | TSS   |
|--------------------|-------|------------|----------------|--------------|------------------|--------|----------------|-----------------|-------|
|                    |       | C          | mg/l           |              | m                | mg N/l | mg N/l         | mg P/l          | mg/l  |
| Two Run            | U     | 18.9       |                | 5.0          | 0.71             | 0.06   | 0.65           | 0.28            | 2.40  |
| Two Run            | D     | 22.5       |                | 5.0          | 0.24             | 0.14   | 0.02           | 0.02            | 26.60 |
|                    |       |            |                |              |                  |        |                |                 |       |
| Pindell            | U     | 18.0       | 9.0            | 6.0          |                  | 0.04   | 0.74           | 0.08            | 2.40  |
| Pindell            | D     | 18.5       | 8.0            | 6.0          |                  | 0.08   | 0.66           | 0.03            | 3.40  |
|                    |       |            |                |              |                  |        |                |                 |       |
| Galloway           | U     | 19.0       | 6.6            |              | 1.20             | 0.10   | 3.95           | 0.33            | 4.10  |
| Galloway           | D     | 19.0       | 7.2            | 6.0          | 0.60             | 0.13   | 2.50           | 0.04            | 9.30  |
|                    |       |            |                |              |                  |        |                |                 |       |
| <b>Ideal Range</b> |       |            | <b>&gt;5.0</b> | <b>6 - 8</b> | <b>&gt; 0.50</b> |        | <b>&lt;1.0</b> | <b>&lt;0.10</b> |       |

## Biological Monitoring

### Benthic Macroinvertebrates

Table 2. Macroinvertebrates collected in the Sanctuary's three creeks  
June 18, 2011

|   | Two Run   | Galloway   | Pindell   |
|---|-----------|------------|-----------|
| <b>Number of Families</b>                     | 10        | 7          | 9         |
| <b>May-, Stone-, Caddisfly (EPT) Families</b> | 1         | 1          | 0         |
| <b>Diptera (True Fly) Families</b>            | 2         | 0          | 2         |
| <b>Intolerant Families</b>                    | 1         | 0          | 0         |
| <b>Number of organisms</b>                    | <b>50</b> | <b>170</b> | <b>39</b> |

The optimum sampling season for stream macroinvertebrates is March – April. During that period, the organisms, near the end of the aquatic phase of their life cycle, are larger and easier to identify. On the Stream Blitz date, a low number of organisms was collected in Two Run and Pindell Creeks (60 is considered reasonable number for ranking a stream, according to MBSS). In June, many insect families, including those more sensitive to pollution, have transformed into adult terrestrial stages and left the streams. Of the 170 organisms captured in Galloway Creek, 100 were scuds (amphipods), and 22 were sowbugs (isopods). Previous monitoring in the spring (Mar – Apr) season has indicated an Index of Biotic Integrity of Fair for Two Run and Pindell Creeks, but Poor for Galloway Creek.

### Fish

A larger variety of fish species was captured in Galloway Creek than in Two Run Creek (Table 3). Species found in both creeks during the Stream Blitz included Creek Chubsucker, Eastern Mudminnow, Least Lamprey, Blacknose Dace, and Tessellated Darter. The Green Sunfish (*Lepomis cyanellus*) was documented in Galloway Creek for the first time—a new species for the Sanctuary. Seining and dip net collections in Pindell Creek yielded 21 Blacknose Dace and five Mudminnows.

**Table 3. Fish capture via electroshocking, June 18, 2011**

| <b>Species</b>           | <b>Two Run</b> | <b>Galloway</b> |
|--------------------------|----------------|-----------------|
| American Eel             |                | 7               |
| Blacknose Dace           | 35             | 34              |
| Bluegill                 |                | 57              |
| Brown Bullhead           |                | 2               |
| Creek Chub               | 36             |                 |
| Creek Chubsucker         | 2              | 23              |
| Eastern Mudminnow        | 23             | 8               |
| Fathead Minnow           |                | 1               |
| Golden Shiner            |                | 2               |
| Green Sunfish            |                | 4               |
| Least Brook Lamprey      | 11             | 1               |
| Pumpkinseed              |                | 33              |
| Rosyside Dace            | 63             |                 |
| Tessellated Darter       | 1              | 3               |
|                          |                |                 |
| <b>Total</b>             | <b>175</b>     | <b>171</b>      |
| <b>Number of species</b> | <b>7</b>       | <b>12</b>       |

We calculated an index of biotic integrity (IBI) for Two Run and Galloway Creeks based on the electroshocking samples. The fish IBI is based on the fish assemblage's taxonomic and trophic composition and the abundance of fish. A good quality stream supports a variety of fish, including more sensitive species. For a more detailed explanation of IBI, see appendix.

**Table 4. Fish Index of Biotic Integrity\* for Two Run and Galloway Creeks, June 18, 2011**

| <b>Fish</b>                                | <b>Two Run</b> |                           | <b>Galloway</b> |                           |
|--|----------------|---------------------------|-----------------|---------------------------|
|  |                | <b>Score</b>              |                 | <b>Score</b>              |
| <b># Benthic species</b>                   | 7.6            | 5                         | 1.19            | 5                         |
| <b>% Tolerant</b>                          | 55.6           | 5                         | 81.7            | 3                         |
| <b>% Generalist, Omnivore, Insectivore</b> | 94.6           | 3                         | 99.4            | 1                         |
| <b>% Round bodied Suckers</b>              | 1.17           | 3                         | 13.1            | 5                         |
| <b>% Abundance Dominant Taxa</b>           | 36.8           | 5                         | 32.6            | 5                         |
| <b>FINAL IBI SCORE</b>                     |                | <b>4.2</b><br><b>FAIR</b> |                 | <b>3.8</b><br><b>FAIR</b> |

\*see appendix for index of biotic integrity explanation

- Fish IBIs scores for Two Run and Galloway Creeks were similar, indicating a Fair ranking for stream health.
- A higher percentage of species that are tolerant to stream degradation live in Galloway Creek.
- Galloway Creek had a higher percentage of Creek Chubsuckers, which are a more sensitive benthic species.
- Rosy-sided Dace were the dominant taxa in Two Run Creek (63 individuals); Bluegills were dominant in Galloway (54). However, the species distribution was not skewed heavily by any one species. *Lepomis* (Bluegills, pumpkinseed, and sunfish) comprised 55% of the fish in Galloway Creek.



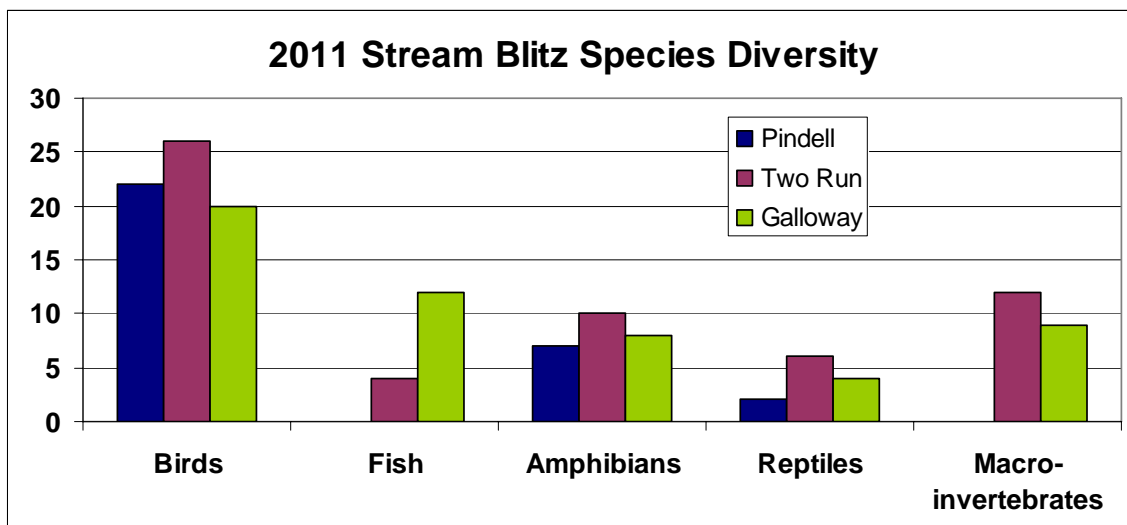
## Biodiversity in Three Stream Valleys

Stream valleys are hotspots of biodiversity because of the moist habitat, rich soils, and abundant food sources originating with both aquatic and terrestrial insects. A total of 128 species was found during the survey. Table 4 lists the diversity of different groups of organisms. Figure 3 demonstrates that similar diversity was observed in the three creeks, with the exception of higher fish diversity in Galloway Creek.

**Table 5. Groups and number of species observed**

| Organism Group                       | Species Observed |
|--------------------------------------|------------------|
| Ferns                                | 6                |
| Herbaceous Plants                    | 22               |
| Trees                                | 12               |
| Benthic Macroinvertebrates (Insects) | 14               |
| Crustaceans                          | 4                |
| Fish                                 | 13               |
| Frogs and Toads                      | 10               |
| Salamander                           | 1                |
| Turtles                              | 4                |
| Snakes                               | 3                |
| Birds                                | 37               |
| <b>Total Species Observed</b>        | <b>128</b>       |

**Figure 3. Biodiversity observed during 2011 Stream Blitz**



### Vegetation

Vegetation was surveyed only in the Pindell Creek floodplain, where 40 plant species were found. (See Appendix B)

- Six of the 17 ferns known to grow in the Sanctuary were identified: Christmas, Grape, Hay Scented, Lady, New York, and Sensitive ferns.
- Moisture loving trees such as Red Maple, Sycamore, River Birch, Tupelo, and Ash grew in this habitat, as well as American Beech, Hickory, Tulip, American Holly, Sweet Gum, and several species of oaks.

## Frogs and Toads

- Ten species of frogs and toads (of the 12 known in the Sanctuary) were heard calling or observed in the three creeks. See Table 6.
- The Cricket Frog was not found in Galloway Creek.
- The Green Treefrog and the Bullfrog were not observed in Pindell Creek.

**Table 6. Frogs and Toads. Observations from stream herp searches and nocturnal call surveys.** Obs = Observed; C = Calling

| Species  | Two Run | Pindell | Galloway |
|--|---------|---------|----------|
| Cricket Frog<br>( <i>Acris crepitans</i> )     | Obs     | Obs     |          |
| Gray Treefrog ( <i>Hyla chrysoscelis</i> )     | C       | C       | C        |
| Green Treefrog ( <i>Hyla cinerea</i> )         | C       |         | C        |
| Bullfrog<br>( <i>Rana catesbeiana</i> )        | Obs     |         | Obs      |
| Green Frog<br>( <i>Rana clamitans</i> )        | Obs, C  | Obs     | Obs      |
| Pickerel Frog<br>( <i>Rana palustris</i> )     | Obs     | Obs     | Obs      |
| Wood Frog*<br>( <i>Rana sylvatica</i> )        | Obs     | O       | O        |
| S. Leopard Frog ( <i>Rana utricularia</i> )    | O       | O       | O        |
| American Toad<br>( <i>Bufo americanus</i> )    | O       | O       | O        |
| Fowler's Toad<br><i>Bufo woodhousii fowler</i> |         |         | O        |

\* 100+ metamorphs in Two Run Creek

## Other Herps

- Seven Northern Two-lined Salamanders were found in Two Run Creek.
- Observers found four turtle species: Eastern Painted, Eastern Mud, Red-Bellied, and Eastern Box Turtle.
- Snakes observed included: Eastern Rat Snake, Northern Water Snake, and Northern Ringneck Snake. A Five-lined Skink was also found.

## Birds

Similar bird diversity was observed in the three creeks. Despite fewer reaches sampled in Two Run, the abundance of birds in the three stream valleys was similar. A total of 37 species was observed.

**Table 7. Birds observed in three stream valleys during Stream Blitz morning point counts.**

| Species                | Two Run | Pindell | Galloway |
|------------------------|---------|---------|----------|
| Acadian Flycatcher     | X       | X       | X        |
| American Crow          | X       |         | X        |
| American Goldfinch     |         |         | X        |
| American Robin         | X       | X       |          |
| Blue Grosbeak          |         |         | X        |
| Blue-Gray Gnatcatcher  |         |         | X        |
| Carolina Chickadee     |         | X       |          |
| Carolina Wren          |         | X       |          |
| Chipping Sparrow       |         | X       |          |
| Common Grackle         |         |         | X        |
| Common Yellowthroat    | X       |         | X        |
| Downy Woodpecker       | X       | X       | X        |
| Eastern Towhee         |         | X       | X        |
| Eastern Wood Pewee     | X       | X       |          |
| Indigo Bunting         | X       | X       |          |
| Louisiana Waterthrush  | X       |         |          |
| Mallard                | X       |         |          |
| Mourning Dove          |         |         | X        |
| Northern Cardinal      | X       | X       | X        |
| Northern Flicker       | X       |         |          |
| Northern Parula        | X       | X       | X        |
| Orchard Oriole         |         |         | X        |
| Osprey                 | X       |         | X        |
| Ovenbird               | X       | X       |          |
| Pileated Woodpecker    | X       | X       | X        |
| Red-bellied Woodpecker | X       | X       |          |

**Table 6, continued**

| <b>Species</b>                 | <b>Two Run</b> | <b>Pindell</b> | <b>Galloway</b> |
|--------------------------------|----------------|----------------|-----------------|
| <b>Red-eyed Vireo</b>          | X              | X              | X               |
| <b>Red-winged Blackbird</b>    | X              |                | X               |
| <b>Scarlet Tanager</b>         | X              | X              | X               |
| <b>Song Sparrow</b>            |                | X              |                 |
| <b>Summer Tanager</b>          | X              |                |                 |
| <b>Tufted Titmouse</b>         | X              | X              | X               |
| <b>White-breasted Nuthatch</b> | X              | X              | X               |
| <b>Wood Duck</b>               | X              |                |                 |
| <b>Wood Thrush</b>             | X              | X              | X               |
| <b>Yellow-billed Cuckoo</b>    | X              | X              |                 |
| <b>Yellow-throated Vireo</b>   | X              |                |                 |
| <b>Diversity (# Species)</b>   | <b>26</b>      | <b>21</b>      | <b>20</b>       |
| <b>Abundance</b>               | <b>54</b>      | <b>56</b>      | <b>69</b>       |

- Blue Grosbeak, Grackle, and Orchard Oriole were observed only in the Galloway Creek stream valley, where a wider, more open floodplain provides habitat for these species.
- Forest interior species observed in the more densely wooded Two Run and Pindell Creek floodplains (but not found in Galloway) include: Eastern Wood Peewee, Ovenbird, Scarlet Tanager, and Yellow-billed Cuckoo. Louisiana Waterthrush and Yellow-throated Vireo were observed only in the Two Run stream valley.
- The Beaver Pond in the Two Run stream valley provide habitat for Mallards and Wood Ducks.
- Osprey were seen at the mouths of Two Run and Galloway Creeks. The mouth of Pindell Branch is a tidal swamp, compared to the open wetlands of the other two creeks

## **Conclusions**

The one-day Stream Blitz is a valuable way to obtain a snapshot of biological diversity simultaneously in three streams. It provides an opportunity for volunteers to visit habitats that they have never seen before, and to learn about sampling techniques, organism identification, and stream ecology. Surveying three streams requires many volunteers and team leaders; lack of volunteers for some habitats and organism classes left a few gaps in the data. Data gathered during a one-day blitz does not capture short term, seasonal, or long-term variations. However, a blitz encompasses more phylogenetic groups than longer, more intensive studies. As such, it is an excellent way to obtain a snapshot of biodiversity.

## **References**

New Biological Indicators to Better Assess the Condition of Maryland Streams. Maryland Department of Natural Resources. Chesapeake Bay and Watershed Programs Monitoring and Non-tidal Assessment. #CBWP-EA-15-03



## Appendix A

### Explanation of Fish IBI Scoring

The fish index of biotic integrity is based on the fish assemblage's taxonomic and trophic composition and the abundance of fish.

Coastal Plain stream metrics for fish are as follows:

- the number of benthic species, (i.e., darters and lampreys, which are sensitive) per catchment area (acres).
- % species that are tolerant to pollution and stream degradation
- % Generalist, Omnivore, Insectivore species that are not specialists in their diets.
- round bodied suckers, which are sensitive to physical and chemical habitat degradation
- Distribution of taxa, i.e. evenness contrasted with the dominance of a single taxa

| Coastal Plain Fish IBIs         | Thresholds  |             |         |
|---------------------------------|-------------|-------------|---------|
|                                 | 5           | 3           | 1       |
| Number of Benthic Species       | $\geq 0.22$ | 0.45 – 0.71 | $<0.45$ |
| Percent Tolerant                | $\leq 68$   | 69 – 97     | $>97$   |
| Percent GOI                     | $\leq 92$   | 93 – 99     | 100     |
| Percent Round-bodied Suckers    | $\geq 2$    | 1           | 0       |
| Percent Abundance Dominant Taxa | $\leq 40$   | 41 - 59     | $>69$   |

| <b>Appendix B. Plant species observed in Pindell Creek Floodplain - June 18, 2011</b> |                  |                            |                      |
|---|------------------|----------------------------|----------------------|
| <b>Group</b>  | <b>Family</b>    | <b>Scientific Name</b>     | <b>Common Name</b>   |
| Fern  | Aspleniaceae     | Athyrium filix-femina      | Lady Fern            |
| Fern  | Aspleniaceae     | Polystichum acrostichoides | Christmas Fern       |
| Fern  | Aspleniaceae     | Thelypteris noveboracensis | New York Fern        |
| Fern  | Dennstaedtiaceae | Dennstaedtia punctilobula  | Hayscent             |
| Fern  | Opioglossaceae   | Botrychium                 | Grape Fern           |
| Fern  | Polypodiaceae    | Onoclea sensibilis         | Sensitive Fern       |
| Herbaceous Plant  | Anacardiaceae    | Toxicodendron radicans     | Poison Ivy           |
| Herbaceous Plant  | Araceae          | Arisaema triphyllum        | Jack-in-the-pulpit   |
| Herbaceous Plant  | Asteraceae       | Bidens bipinnata           | Spanish Needles      |
| Herbaceous Plant  | Balsaminaceae    | Impatiens capensis         | Jewelweed            |
| Herbaceous Plant  | Berberidaceae    | Podophyllum peltatum       | Mayapple             |
| Herbaceous Plant  | Cyperaceae       | Carex crinita              | Sedge                |
| Herbaceous Plant  | Cyperaceae       | Scirpus                    | Bullrush             |
| Herbaceous Plant  | Cyperaceae       | Scirpus polyphyllus        | Many-leaved Bulrush  |
| Herbaceous Plant  | Cyperaceae       | Symplo carpus              | Sedge                |
| Herbaceous Plant  | Juncaceae        | Juncus effusus             | Soft rush            |
| Herbaceous Plant  | Lamiaceae        | Geleochocha herderacea     | Gill-over-the-ground |
| Herbaceous Plant  | Lamiaceae        | Lycopus                    | Water Whorehound     |
| Herbaceous Plant  | Onograceae       | Circaea                    | Enchanted Nightshade |
| Herbaceous Plant  | Orchiaceae       | Goodyera pubescens         | Rattlesnake Plantain |
| Herbaceous Plant  | Orobanchaceae    | Epifagus                   | Beechdrops           |
| Herbaceous Plant  | Poaceae          | Microstigeum vimineum      | Japanese Stiltgrass  |
| Herbaceous Plant  | Polygonaceae     | Polygonum punctatum        | Smartweed            |
| Herbaceous Plant  | Rubiaceae        | Galium                     | Bedstraw             |
| Herbaceous Plant  | Saururaceae      | Saururus cernuus           | Lizard Tail          |
| Herbaceous Plant  | Urticacea        | Boehmeria                  | False Nettle         |
| Herbaceous Plant  | Violaceae        | Viola                      | Violet               |
| Tree  | Aceraceae        | Acer rubrum                | Red Maple            |
| Tree  | Aquifoliaceae    | Ilex opaca                 | American Holly       |
| Tree  | Betulaceae       | Betula nigra               | River Birch          |
| Tree  | Cornaceae        | Nyssa sylvatica            | Tupelo               |
| Tree  | Fagaceae         | Fagus grandiflora          | American Beech       |
| Tree  | Fagaceae         | Quercus                    | Oak sp.              |
| Tree  | Fagaceae         | Quercus alba               | White Oak            |
| Tree  | Fagaceae         | Quercus rubrum             | Northern Red Oak     |
| Tree  | Hamamelidaceae   | Liquidambar styraciflua    | Sweet Gum            |
| Tree  | Juglundaceae     | Carya                      | Hickory              |
| Tree  | Magnoliaceae     | Liriodendron tulipifera    | Tuliptree            |
| Tree  | Oleaceae         | Fraxinus                   | Ash                  |
| Tree  | Plantaceae       | Platanus occidentalis      | Sycamore             |