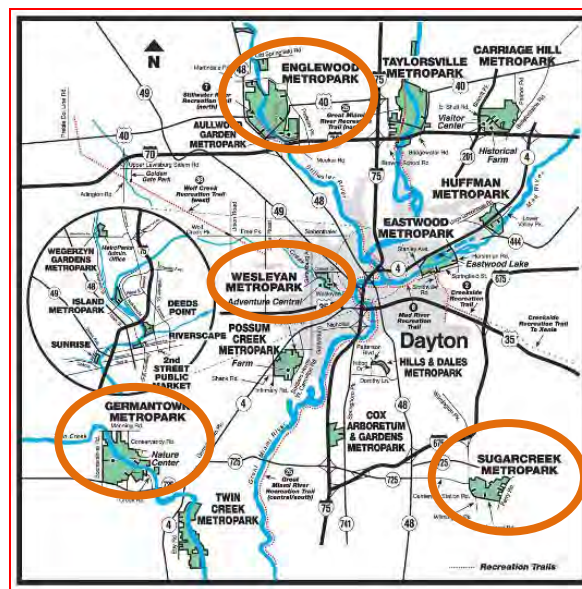




Thank you for continuing to get the children you serve outdoors! In today's world, our kids are becoming disconnected with nature more than ever, yet it is nature that keeps us alive! By getting your kids outdoors, you're helping them to see that we depend on clean soil, air, water, and biodiversity, and nurturing their environmental ethic. In addition, there are tremendous benefits to youth exploring outdoors, including maintaining a healthy mind and body as well as improving learning and social skills.

This PDF will orient you to the Natural Adventures boxes, how to reserve and use them, help you make important safety decisions, and give you tips on interacting with your kids outdoors. It includes ideas on how to set up your outdoor adventure, games and activities you can engage with, but common nature myths that you may hear from your kids, and background information on common natural history. In addition to this packet, we encourage you to call 1-800-wildlife and ask for free field guides which can help enhance your outdoor learning adventure. You can see PDF versions of these guides at: <http://wildlife.ohiodnr.gov/stay-informed/publications> and click on "Identification Guides"

MetroParks has 4 Natural Adventures Boxes located throughout the county, and are now available to you on a reservation basis. Inside the boxes you will find creek nets, aerial insect nets, various containers, and other resources unique to that site. Boxes are located at Englewood, Wesleyan, Sugarcreek, and Germantown. The following pages will profile each box, maps of their specific location, a map showcasing different habitats ready for exploration, and photos so you know what to expect when you get there. Please check your permit email, which should come as soon as you reserve the kit, for your 4-digit combination code to open the boxes (more information is on page 6.)



# Sugarcreek MetroPark



## About The Park:

- **600 Acres**
- **Purchased in 1966 as 2 separate farms, and was last farmed in 1968**
- **550 year-old oak trees, the Three Sisters, are definitely worth a visit**
- **An old-fashioned fence row is now the Osage Orange Tunnel**
- **Home to MetroPark's only population of Spotted Salamanders**
- **The Sugar Creek is home to Rainbow Darters, Two-lined Salamanders, and Long-tailed Salamanders**

## Directions to Park and Natural Adventure's Box

Take Wilmington Pike south through Bellbrook. You will cross I675 and SR725/Alex Bell Road. After going down a hill and passing Centerville-Station Road on the right, you will pass the Sugarcreek MetroPark Riding Center on your left. You will come to a stop sign. Here, Wilmington Pike turns to the right, but you want to go straight, turning onto Conference Road. The parking lot is about ¼ mile up on the left. The Natural Adventure Box is located on the left side of the restrooms.



## Germantown MetroPark



### About The Park:

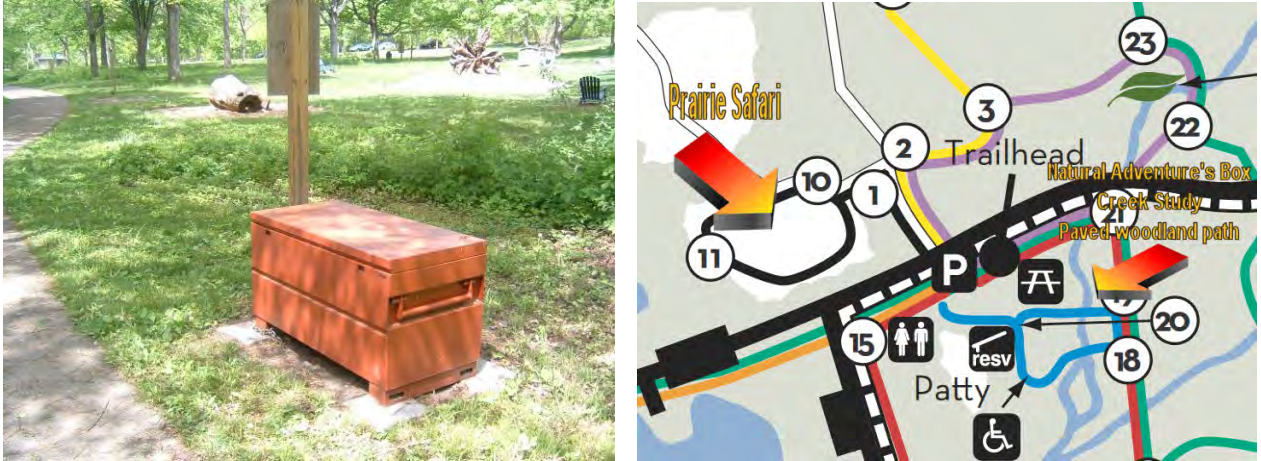
- **1655 Acres**
- **Watchable Wildlife Viewing Site by the Ohio Department of Natural Resources**
- **Important Bird Area by the National Audubon Society**
- **Underground nature center with exhibits, and 500 feet of boardwalk**
- **Reservable Shelters**
- **14 miles of hiking trails**
- **Twin Creek, one of the most pristine waterways in Ohio, runs through the park**

### Directions to Natural Adventure's Box

Follow St RT 4 south. Pass Possum Creek MetroPark and go through the intersection of Farmersville West Carrollton Rd. Turn Right onto Manning (West). Go through 2-way stops at Diamond Mill Rd and Valley View High School. Turn Left onto Conservancy Rd. Pass the Parks and Service Office (6675 Conservancy Rd) on your right, then around two sharp turns but remain on Conservancy Rd. Turn left onto Old Mill Rd and park at the dead end of the lane at the bottom of the hill. The box is across the lawn on your left. If you miss the turn for Old Mill Rd you will come to a stop sign at 7101 Conservancy Rd. You have gone 100 yards too far and need to turn around.



## Englewood MetroPark



### About The Park:

- **1900 Acres**
- **20 miles of hiking trails**
- **Patty's Falls is a 'can't miss' hiking destination**
- **Lake areas provide excellent shorebird watching opportunities**

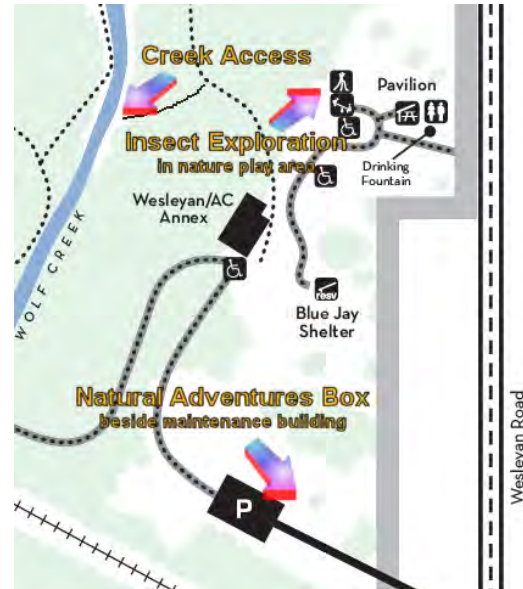
### Directions to Park and Natural Adventure's Box

From I 75, go west on I 70. Get off at the 2<sup>nd</sup> exit which is the Englewood exit and go north (right) on SR 48. Turn right on US 40, and cross over the dam. Turn left into the park entrance, and the road will meander down a hill to a stop sign. Turn right, and follow the road to the Patty's Shelter area, which you will find about ¼ a mile on the right, near the Nature Play Area. The Natural Adventures Box is located along the Nature Play Area where there is a wooded area perfect for ecological exploration, as well as an ankle-deep creek to find creatures like salamanders and small crawdads.

Crossing the road from the shelter you will find the trailhead which can take you to a meadow for exploring insects, and observing wildflower and animal interactions.



## Wesleyan MetroPark



### About the Park:

- **55 Acres**
- **1 ½ mile hiking trails**
- **Home of Adventure Central**
- **Railroad bridge transformed to a pedestrian foot bridge across Wolf Creek**

### Directions to Park and Natural Adventures Box

From I-75, take exit 58 to Needmore Rd. turn right on to Needmore Rd. and head straight. Needmore will turn into Shoup Mill rd and Turner Rd, you will drive about 2.6 miles. Turn left onto Philadelphia Dr and continue for 2.5 miles. Then turn right onto Cornell Dr, you will drive .5 miles then make a left onto Wesleyan Rd. Go to the 2<sup>nd</sup> entrance has a parking lot at the end on the left hand side. The Natural Adventures box will be located on the west side of the building.



## How to open your Natural Adventure's Box:



Your Natural Adventures Boxes are secured by ordinary combination locks installed into the box. All you have to do is dial the code into the lock, then push on the lock itself. When the correct combination is entered, the lock will pop out, releasing its hold on the lid catch. Both locks work the same way.

Locking the box is very easy. After verifying that all the contents has been returned in good order, simply close the lid, scroll the tumbler dials to another combination, then push in the lock. Sometimes locks become misaligned once they become unlocked, so you may have to wiggle the lock up and down while pushing in order for it to lock into place.



**Please do not leave the box open or unlocked while unattended, even if all the supplies are being used. An unlocked box can be a hazard to the general public.**

## Where can you find the 4-digit combination to open the box?

Please remember to check your email for the 4-digit combination! It will be included in the same email as your permit!

If you feel that the box has missing items or needs repair/attention, please contact us at 937-275-7275, and ask for Lauren or Joshua.

## What's in Each Box?

Each Natural Adventures Box contains:

- 15 aquatic nets
- 15 aerial nets
- 15 critter containers
- 15 giant magnifying glasses
- 1 large wet box
- 1 dry box with brochures
- 1 Peterson Field Guide to Birds of Eastern North America
- 2 Laminated Biotic Indexes
- 2 Laminated Creek Guides
- Laminated park maps

Sugarcreek and Germantown are known fossil collecting areas, and that can be a fun activity to do with children. Fossils you are most likely to find are on page 32, with drawings. However, in those two Natural Adventures Boxes, there are additional fossil-based supplies:

- Laminated fossil brochures



**You can always bring out your own supplies to add to your Adventure!**

**If you feel that the box has missing items or needs repair/attention, please contact us at 937-275-7275, and ask for Lauren or Joshua.**

## Emergency Procedures and Safety

It is your responsibility to make sure the area you're entering is safe, and that your children are prepared. Here are some guidelines you should follow to ensure the safety of yourself and your group:

- Make sure you're aware of any allergies your children have, and make sure medicine is available.
- For stream programs, make sure everyone has closed-toed shoes (no sandals).
- Do not enter any waterway if it is muddy and you can't see the bottom.
- Never go over knee deep in any waterway.
- Be aware of the weather and use common sense. Dangerous conditions, such as thunder storms, heavy snow, and strong winds should be avoided. Children should wear sun screen when necessary.

CALL 911 For Emergencies!!!

Call 225-HELP for non-emergencies to get a ranger. This number gets you to Montgomery County Dispatch.





## Other Activities in the Parks

### Talking Trees

With the recent sighting of the Emerald Ash Borer within our area MetroParks has been conducting a Reforestation Campaign to help keep our forests full of native trees and shrubs. The Emerald Ash Borer targets ash trees, once they lay their eggs the larvae chew into the trees circulatory system and feeds on the vital nutrients the tree needs to survive, ultimately killing the tree.

As you travel out the parks you may notice little green signs on some of the trees those are ash trees that are being treated to help prevent them from being infested with the Emerald Ash Borer. Along with those you may notice some of the trees having larger plaques on them with phone numbers and QR codes, these trees have an important message they want everyone to hear. So with the help of your smartphone either calls the number or scan the QR code provided on the plaque and see what these trees have to say!



### Trail Thoughts

Before any trip there are always things that you run through your head to make sure your group is ready for the day. Here are some thoughts we often think about before we go out with our groups for any program.

**What are my kids wearing?** Check to see if everyone is wearing the proper clothing, such as boots, coat, gloves, hat, poncho or raincoat. Check for things they are not supposed to have, like a heavy backpack. It is important for your children to be comfortable for them to have a good time.

**What are my rules?** Make your rules clear from the beginning, and hold to them. It is much easier to lighten up during a program than to be a policeman. Common rules are:

Please ... let the plants grow ... keep trash in your pockets ... stay with the group and behind the leader... leave the sticks on the ground ...

**What do I want my kids to get out of this experience?** What are the expectations you would like the kids to get out of this trip. Do you want them to just have fun and explore with no expectation of learning a specific item, or are there specific items you want them to see or learn about.

## Interpretation Techniques for Young Children

Many of us have our own ways of getting kids interested in nature. That is what nature interpretation is all about, sparking an interest! Once a child is interested, his/her natural enthusiasm will carry him/her the rest of the way! Here are some *classic* techniques used by many naturalists in the Dayton area. They may add to your children's experiences on your hike!

- Children remember themes more than individual facts. When taking children on a walk, discuss how everything is dependant on the sun, or how everything is connected somehow. There are a tremendous amount of themes out there for you to use.
- Sell an idea with labeling. A peanut butter commercial does it all the time; "Choosy mothers choose Jif!" Apply it to your walk like "Smart people don't litter!"
- Begin your topic with thought provoking sentences like "Think of the last time you...", "Have you ever...", "How many of you have ever..." and "At one time or another most of us have..."
- Older children love to have something to focus on during the hike, so give them a 'mission'. This can be anything from finding a blue flower to counting ladybugs or finding shapes in nature! Try tying this to the theme. "Who's going to be the first person to find a red flower?"
- To get children in a circle quickly, ask all of them to make 'chicken wings' with their arms, then put their elbows together. This creates a circle with enough room to breathe, but small enough that everyone gets a good close look. Give this circle a name like "chicken wings" or "elbow circles". This way, the next time you need a circle, just say that magic word! Adding a time limit makes it more fun; see how fast they can do it at the end of the hike!
- At the beginning of the hike, we are all familiar with discussing the "no picking" rule. Add a small kick by giving them permission to pick "people flowers" (litter). Ask them what people flowers are. Soon you may have your kids picking up trash on the trail while learning a lesson and making the park look much more beautiful!
- When talking to an outside group, position them so that you are the only one facing the sun, rain, discomforts, etc.



## Naturalist Trail Sack

Many naturalists carry a sack with all kinds of goodies to use on the trail. There are many things that we would like to have with us, but we are limited to the size of our sack and the weight we can carry. Here is a list of things commonly found in naturalist's sacks.

**2 8-foot ropes:** Rope can be used for quite a few things on the trail. It can be used to measure things and guide children on 'blind walks'. Use them to set boundaries for games too!

**See Boxes:** These containers with the built-in magnifying glass are perfect for capturing smaller creatures and looking at them.

**10 Magnifying Glasses:** These can be used for every program!

**Common ID Cards:** These are photos of common animals found in the park, or photos of animals from commonly asked questions. On the back of each one contains information on the life history of that particular animal that is useful for interpretation. These cards can also be used to play many games, like modified "steal the bacon" games and "Who am I?"

**Fossil ID Cards:** For you to give out to teachers, so that they can help the kids ID the fossils they find. On the back explains how that animal lived many years ago.

**Eye Dropper:** For handling small animals you might find in water; crustaceans, hydra, etc. Also use in water quality tests.

**Ruler:** For measuring and comparing tree branch thickness, tracks, insects, flower petals, etc. To get the children involved in using equipment in nature/recording data.

**Insect Net:** Folding insect nets are great to use on the trail, and fit right in your sack!

**Multitool:** Can use it to cut open galls, tree buds, seeds, etc.

**Notepad and Pencil:** Use for jotting down ideas, a child's name that got hurt, a description of a law offender in a park, or to draw a picture of a flower to identify later.

**First Aid Kit:** You can never be too careful! This kit is for you to provide to the parent and teacher. Let them use it, not you!

**Tissues:** You know that kid that always has a booger hanging out of his nose? Give him one of these.

**Insect Repellant:** This is in the kit for your convenience only. Do not spray on any children. You may get the teacher or parent to spray though.

**Compass/Thermometer:** For your knowledge of temperature, direction. Use it how you want, but don't put it in the water to check water temperature.

**Large flashlight/LED flashlight:** For night hikes, looking in dark areas.

**Whistle:** For control, games, etc.

## Trail Activities

- Pretend you're a particular animal looking for a place to make a home. What would you look for? How would you search for it (senses)?
- Find something square. This is almost impossible, but is a good activity to increase observation; getting children to use their eyes.
- Have the children close their eyes as they pass around an object. Later, have them describe what they felt, and figure out what it was.
- Find the tallest, smallest, most colorful, etc. plant or animal.
- Find an area where children can spread apart and engage themselves in their own thoughts. Allow them about 5 minutes to draw, write poetry, discover, or just sit and listen to the sounds of your habitat!
- Give children manmade objects and have them explore nature by finding natural objects that feel or look like their object (use colors, shapes, textures).
- Fox ears: Cup your hands around your ears to enlarge them. Listen for animals or enjoy the sounds of a stream. See how many different sounds they can all discover!

**Teach By Example:** Pick up any litter, treat all plants and animals with respect and admiration that every living thing on this earth has earned.

**Teach By Experience:** Use as many senses as possible (smell, touch, sight, hearing, taste). Your children will learn by doing the same.

**Create Excitement:** Watch the children's energy level and direct activities to that level. Respond to and encourage children's enthusiasm and curiosity. Share your own excitement whenever possible. It is extremely contagious!

## Get Outside Book Club

Dayton Metro Library and Five Rivers MetroParks are partnering together to provide local families with pre-k children and pre-k childcare professionals with fun outdoor inspired books and activities that promote an early start to reading while connecting with fun outdoor activities. For more information about the Get Outside Book Club visit [www.metroparks.org/getoutside/bookclub](http://www.metroparks.org/getoutside/bookclub)

Don't forget that your local children's librarians can help put a story to just about any activity and help be a role model of fun active reading.

## Interacting With Children Outdoors

**Begin with simple experiences:** When introducing children to nature, start with the most immediate environment so that the children feel safe, comfortable, and know their surroundings. Remember that today may be the first time a child steps into a stream, so prepare them; let them know what to expect.

**Keep children actively involved:** Facilitate children's interactions with the natural world. Let them explore, even if they veer off their mission for a few minutes. Let their interest, curiosity, and excitement carry them where you want to go; don't push.

**Provide pleasant, memorable experiences:** This is more important than the content. If children aren't comfortable (wet, hot, cold, thirsty, need to use the restroom, etc.), they will not have a good time and perhaps be turned off nature. Remember that children have different tolerances; keep your eyes open!

**Emphasize experience versus teaching:** For effective learning, young children need to be involved in sharing and doing versus listening and watching. Ask questions and let them become the program.

**Involve full use of the senses:** Children need to engage with the natural world multiple senses.

**Be an example:** Children are watching you! Become a model of how you would like them to treat nature. Pick up litter, and use additional care when you handle animals, even spiders! Make sure your personal interest and love for nature shows, and spreads!

**Don't show your fear:** Most fear is learned, and children are watching their leaders to know what to be fearful of. Be careful how you behave around species you're not familiar with, and be aware of how you talk about them. Spiders, snakes, and many other creatures are important creatures of Dayton's ecosystem. *Keeping your cool will help kids interact with nature, worry-free.*

**Maintain a warm, accepting, and nurturing atmosphere:** Young children need to know that they are valued and that they can trust the adults who work with them.

## Problems on the Trail

**They won't stay behind me!** To control a group that wants to run ahead, try playing *follow the leader* in single file while weaving in and out of things. Travel like a pack of wolves by walking in the tracks of the person in front of you.

**This one child is keeping me from spending time with the others!** If you have a child who continues to interrupt you with objects he/she has found, have the child help you with tasks or help carry things. Tell him/her to keep the objects until the end of the hike and remind you to talk about them.

**These kids keep talking! They won't listen to me!** When your children begin to get loud, decrease the volume of your voice, or ask them to whisper something back to you. You may also choose to say something like "If you can hear me, put your hand on your head". Keep changing the ending of your question, and those talking will stop so that they can hear your question and be included!

**I have a know-it-all in my group, what do I do?** Once in a while you will have a child that has all the right answers, and wants to continue answering your questions. Usually this child is full of pride (and should be) and is seeking recognition. Give him this recognition by giving him a special leadership position on the hike (have him help other kids). This doesn't have to be recognized by the group, and it gets the child back into the groove of exploration rather than gloating.

**When should I answer my own question?** Many naturalists have asked a question, got no answer, and blurted out the answer sometime in their lives. It is easy to do. Remember to give ample time for the children to think of an answer. Test yourself the next time your children are stumped, and see how long you can comfortably wait. If the answer does not come, try giving clues (relationships the answer has works great). Try not to use clues like "starts with an S".

**My group is overly excited and out of control. How do I get them focused?** Tell everyone to listen to the sounds, and put one finger up for every sound they hear. Also, you can also ask them to walk like a Native American hunter. This gets them to walk quietly. You may want to try playing a trail game too.

**I see something I am scared of, but the kids are interested! What should I do?** Do not show your fear. Your kids don't deserve the fear that you've acquired when you were younger. Making them avoid something is better than interacting and showing your fear. Remember, fear is different than respect, but often go together. If the kids are scared, generate interest by asking questions. Get them to pay attention to it.

## Excellent Tips For Presenting Games

- Keep the rules and verbal instructions to a minimum to avoid boredom and confusion – most people learn best by watching and then doing.
- If you are the instruction reader, avoid being a spectator or sideliner; get involved and play as many games as you are comfortable with.
- Don't worry about sticking to the rules. Change and bend them as you go.
- Look for signs of "enough" and then introduce a new game before interest begins to wane.
- If possible, keep the players in the game, amid or alter rules that permanently eliminate people.
- Start with an activity or session that brings the whole group together.
- Alternate between active and quiet activities.
- If people are tired or just waking up, start with quiet activities. If the players are young or have been sitting, start with active games.
- If there are teams needed, avoid a situation where people are picked; use creative ways of forming teams.
- Have enough activities in hand to last more than the entire allotted playtime.
- Have the equipment ready before beginning to avoid participant boredom.
- Encourage players to make creative alterations within the activities or to try different homemade versions.
- Get some feedback during the session as well as the end (likes, dislikes, and suggestions).
- Emphasize competition against self or a team record when competition seems natural. Avoid winners and losers; someone will feel bad.
- Discourage negative criticism and encourage acceptance of people's differences.
- End with a quiet activity that allows everyone to regroup in a fun way, and try to leave the players laughing.
- Emphasize challenge over competition. Try to de-emphasize the importance of outcomes. Temper the spirit of competition with the spirit of cooperation.
- Send a clear message that you want everyone to play and that you want them to feel good about playing. If you express a caring attitude then you establish trust as the basis of play.
- When playing active games reiterate the principal of caring restraint...we'll use only the force necessary to match that of our opponents.
- A game can be an end in itself. It doesn't always have a deeper lesson or reason for happening. Fantasy is the essence of play. When we decide to be a great warrior or a train we're taking a quantum leap out of the real world. Create a space where people can let themselves go, be free, and where they can act without consequence or connection to the real world. Enjoy!

## Active Games

### 4 Trees

*Age:* 5+

*Needed:* 4 Trees close together w/out poison ivy, picnic tables, etc...

*Procedure:* Name the trees 1, 2, 3 & 4. Choose one person to be the *guesser*. The guesser stands with his/her back to all 4 trees for the whole game. The rest of the group chooses one of the trees four trees to stand next to, with at least one hand on the trunk. The guesser chooses a number: 1, 2, 3 or 4 out loud. Whoever is standing at the tree of the number that was called out is *out* and sits down with the guesser. Everyone chooses a new tree to stand by or stays where they are and the guesser chooses another number (1,2,3 or 4). Whoever is at the tree of the number that was called out is out and the process continues until there is one person left and they are the next guessers. No environmental education value, but FUN!

### Bat and Moth (like Marco/Polo)

*Age:* 6+

*Needed:* bandanas (2-4 for a group of 8)

*Procedure:* Have the group form a circle. Explain that although bats are not blind, they use something else to maneuver through the night: echolocation. Choose one person to be the bat and blindfold him/her. Choose 2-3 other people to be the moths who will join the bat in the middle of the circle. Have the rest of the group ready to keep the bat and moths from going outside the circle. In a marco/polo fashion, the bat will call out *bat* and the moths will answer *moth*. The moths can try to avoid the bat without leaving the circle, and if they do get tagged they join the rest of the group. The last moth to get tagged is the next bat. Take a moment to explain echolocation and that the *bat* calling out and listening for sound waves to come back is similar to a bat's nocturnal hunting technique. To help out you can make the circle smaller or call out *bat* faster.

### Camouflage

*Age:* 5+

*Needed:* nothing

*Procedure:* When hiking on a trail the leader of the group will call out *Camouflage*, and not looking at the players, counts to five out loud. The group has to get camouflaged within the 5 seconds. Talk about how animals camouflage themselves. Completely hiding or getting as small as possible and not moving can camouflage you. If the leader sees you moving he calls out your name and you are out. Play this on the trail when the kids are not expecting it. Speed up your counting to keep the game interesting.

### Catch the Snake's Tail

*Age:* 6+

*Needed:* bandannas

*Procedure:* somewhere, someone's over-active imagination invented a snake that can grasp its own tail in its mouth and roll like a hoop swiftly down a hill. You'll need a good-sized area for this activity, clear of sudden pits and immovable oaks. About eight to ten people line up, one behind the other. Now, everyone puts their arms around the waist or hands on the hip of the person in front of them. (You can't be ticklish around snakes.) If you let go of the person you are holding onto cry *broken snake*, regroup and put your snake back together. The last person in the line tucks a handkerchief in



the back of his/her belt. To work up steam, the snake might let out a few hisses. At the signal, the snake begins chasing its own tail, the object being for the person at the head of the line to snatch the handkerchief. The tricky part of this epic struggle is that the people at the front and the people at the end are clearly competing but the folks in the middle aren't sure which way to go. When the head finally captures the tail, who's the defeated and who's the victor? Everyone! The head dons the handkerchief and becomes the new tail, while second from the front becomes the new head. Two snakes trying to catch each other's tail is formidable and also a great contest.

Variation: not enough people to play this described above? Try two teams, trying to catch the tail of the other team. This will work with as little as two players per snake

### **Hounds and Rabbits**

*Age:* 3+

*Needed:* bandanas & 1 hula-hoop per 3 players

*Procedure:* Spread the burrows (hula hoops) around the playing area. Choose two players to be the *Hounds* who hold a bandana in their hand, so everyone can see it. Divide the rest of the class, the *Rabbits*, into groups of three and have each group stand in a burrow. On the signal the *Hounds* call one, two, three out loud and then howl as loud as they can. Rabbits run from their burrow when they hear the howl and try to find another burrow. Only three Rabbits to a burrow. Hounds try to tag a Rabbit as they change burrows. When you tag a Rabbit, give him the bandana because he becomes the new Hound and you become the Rabbit. *Variation:* Start the game with three or more Hounds

### **Meet a Tree**

*Age:* 6+

*Needed:* one blindfold for every two campers

*Procedure:* The campers pair up and take turns being blindfolded. One person guides his/her blindfolded partner to a nearby tree and allows him time to explore it and get to know it without the use of his eyes. They can be guided in the exploration by asking questions like:

Does the bark feel smooth? Rough?

Can you reach the lowest branch?

What is around the tree at the bottom?

Has your tree been injured in any way?

After they have explored thoroughly, lead them back to the original starting point. Remove the blindfold and have them try to find their tree. To make it a bit tougher, spin the blindfolded players around before you start and before you remove the blindfolds, to disorient them a bit. Once one person has found his tree, switch places and start over.

### **Mice and Owl (like Red Light/Green Light)**

*Age:* 4-8

*Needed:* nothing

*Procedure:* Draw a start line. The counselor is *it* or the *owl*. The other players gather behind the start line, while the owl is about 20 yards away with his or her back to the group. The owl counts to 10 out loud and as fast as possible while everyone runs or walks toward him or her. Once 10 is reached everyone must freeze. As soon as 10 is reached, the owl turns around and any player that is moving is sent back to the start line. The owl counts to 10 again. The first player close enough to tag the owl is the next owl.

## Oh Deer!

*Age:* 7+

*Needed:* large open area

*Procedure:* Have students count off in fours. 1's go to one side of the field and 2's, 3's and 4's go to the other side of the field. The 1's are the white-tailed deer and the 2's, 3's and 4's are elements of a habitat. Ask what makes up habitat? They should tell you food, water, shelter, space and some may tell you arrangement. In this game we are emphasizing *food, water and shelter*. The groups should line up in parallel lines 10 to 20 yards apart with their backs to the other line. Have the deer (group of 1's) make a sign as to what they want (i.e. food, water, shelter). Have the habitat (2, 3, and 4's) make a sign as to what they are. Signs are: food-hands on stomach, water-hands on mouth, shelter-hands together overhead. Once everyone is making their sign the counselor tells them to turn around and face the others. The deer run, still making their sign, toward the habitat, looking for a match. If a match is found they take that person back with them and they become a deer. If a deer does not find a match, it dies and becomes part of the habitat. Everyone should be asked to notice the change in deer population and what affected it. Did too many deer need food and now there is a smaller population? Did all the deer find what they needed in the first round? The second round is played the same way. Everyone can choose a new sign. After each round the group should talk about the change in numbers. Other questions to ask: What could cause a loss of shelter? (People building a parking lot.), What could cause a loss of food or water? (People building a road through a deer habitat cutting the deer off from a stream.)(Too many deer in one spot.) This game is an excellent example of nature, and sometimes man-made occurrences that affect wildlife populations. It can be played until all the deer have joined the habitat.

## Raccoon Babies

*Age:* 8+

*Needed:* large playing area

*Procedure:* The whole group hides their eyes and counts out loud together to 50, while one person goes and hides. Then everyone begins to look for the sardine. When you spot the raccoon baby, you don't tell anyone, then when no one is looking, you slip in and hide with the sardine. Eventually everyone starts to disappear, and the one left notices he's all alone. The first one to find the sardine gets to hide as the sardine the next round. Imagine 5 to 10 kids all huddled together in a tight spot trying to keep from laughing and being seen. You will need to set boundaries and a time limit.

## Snake in the Grass

*Age:* 6+

*Needed:* something to mark boundaries

*Procedure:* This activity might provide the participants with some idea of what it's like to be appendage-less. Beyond that, it's just a fun game of tag with a reptilian twist. Works great in a gymnasium. The starter snake lies down on the ground on his stomach. Everyone else gathers fearlessly around to touch him. (One finger will suffice - you don't want to get too close). When the referee shouts *Snake In The Grass!* everyone runs, staying within the boundaries of the snake area, while the snake, moving on his belly, tries to tag as many as he can. Those touched become snakes too. Non-snakes run bravely around in the snake-infested area, trying to avoid being caught. (For your own sake and the snake's sake, take off your shoes and watch out for snake-fingers.) The atmosphere gets even better if all the snakes are hissing. The last person caught is the starter snake in the next game.

## Spider and Flies

*Age:* 3+

*Needed:* rope or jump rope to mark the circle

*Procedure:* Two goal lines are designated at opposite ends of the playing area. A circle is located equal distance from the two goal lines. A player called the *Spider*, sits in the center of the circle while the other players, the *Flies* walk around the circle. When the spider jumps up and chases after the flies, they flee towards the goal line. The flies tagged become the spider's helpers.

## Steal the Bacon

*Age:* 6+

*Needed:* small samples of leaves, twigs, flowers and seeds from the area. (Roughly 7-10 samples)

*Procedure:* This game has been adapted to help children identify and remember the trees and shrubs in the area. Form two equal teams and line them up facing each other, 30 feet apart. Put the plant specimens in a row on the ground between the two teams. The teams count off separately, so that each player has a number, and on each team there are players numbered one, two, three, etc. When the teams are ready, call out the name of a tree or bush represented by one of the specimens lying between the teams, then call out a number. (To add surprise, call them out of sequence.) "*The next plant is a beech tree, and the number is...three!*" As soon as the *threes* hear their number called, they race to the middle, trying to be the first to find the beech twig. Every successful player earns two points for his or her team. Picking up the wrong specimen results in a loss of two points.

## Thicket

*Age:* 7+

*Needed:* play in prairie, forest or meadow

*Procedure:* Choose one *predator* to count to twenty-five with his eyes closed. Everyone else, the *prey*, goes and hides. The prey hide, but must be able to see the predator the whole time they are hiding. After counting, the predator looks for the prey. The predator cannot move his feet from the designated base. He can squat, stretch, turn around, lean up or down, but he cannot move from his spot. When the predator sees the prey, he must point at the prey and call out "I see....behind the tree, behind the first foundation wall, etc." The predator must always be pointing at the prey and because the prey is always looking at the predator, the prey will know when they have been found. The prey will then come out of his hiding spot and join the predator, not revealing anyone else's hiding spot. Once the predator cannot see anymore prey, the predator closes his eyes, yells *thicket* and counts to fifteen. The remaining prey moves five steps closer to the predator and finds a new hiding spot. This continues until one person is left who is now the new predator.

## Tracking (X's and à's)

*Age:* 8+

*Needed:* two groups, each with an adult group leader

*Procedure:* In this game one group is tracking the other through the park. The adult leaders of the groups should secretly decide where the first group would end up, avoiding any lost groups. The first group leaves arrows on the ground made of sticks or rocks pointing in the direction they are heading. At the intersections of trails X's should be placed where the group is not heading. When they have

reached their destination, they mark a square on the ground and hide in the general area (predetermined by the group leaders). The second group has waited about 15 minutes before heading out to follow the first group. When they successfully reach the square, they find all the members of the first group.

### Tree Needs

*Age:* 6+

*Needed:* tree needs envelope

*Procedure:*

Have participants stand in a straight line on one side of the playing area. That area will be their base. When they are lined up, explain that you are Mother (or Father) Nature and that each one of them is a seedling (a young tree).

Ask them what trees need to survive (water, minerals from the soil, sunlight and carbon dioxide). Ask them what happens to a tree if it does not receive one of these four items (it dies)

Tell them that as Mother/Father Nature, you have scattered these items on the ground (spread the pieces out 20 yards away)

Explain that each tree needs only one of each to survive. When you say go, they run onto the playing area and collect one of each item and return to their base.

When everyone has returned, ask them who survived (has one item of each). In this round everyone survives and it represents their first year of growth.

Before playing another round, ask them to look at the availability of the items left. Discuss what they think will happen during another year? (Many of the trees will die because of the lack of necessities.)

Play another round. Again ask them how many of them survived. Those who did not survive should step forward. Ask them, what happens to trees when they die? (Fall down-decay-turn back into soil) The trees that died should scatter their cards back onto the playing area. Dead trees can be replanted or just sit out and watch until the end of the game.

If the trees are replanted, ask the participants which trees have an advantage, the young ones or old ones? (Old ones because they have deeper roots and are taller.) In order to demonstrate this allow the older trees to take two steps forward. Play another round and see how many trees survive.

After 1 or 2 more rounds of replanting, have the dead trees sit out and play until just a few trees are left.

Wrap-up: gather the group. Ask them what trees need to survive? Do all trees get everything they need? Which trees have an advantage to survive? How does this help the forest? (the stronger, healthier trees survive)

### Wolf in the Forest

*Age:* 5+

*Needed:* nothing

*Procedure:* The object of this game is not to be the next wolf. Choose a base area. One person is the wolf; that person hides while the other people count to 30 on base. The other people stay together and look for the wolf. If the wolf is spotted before he pops out you yell, *wolf in the forest!* and run back to base. When they get close to the wolf, the wolf pops out and tries to tag everyone. Everyone tries to run back to base without getting tagged. The last person tagged is the next wolf.

## Quiet Games

### Animal, Bird, Fish

*Age:* 5 +

*Needed:* Bean Bag

*Procedure:* Everyone sits in a circle. One player is chosen to be it and they are given a beanbag. They toss the beanbag to anyone in the circle, calling out the words, "Animal, Bird, Fish, *Fish!*" and the person who caught the beanbag must name some kind of fish, before the person who is "it" counts to ten. If "it" calls "Animal, Bird, Fish, *Animal!*" the player must name some kind of animal. If whoever catches the beanbag cannot name anything by the time "it" counts to ten, or if they name something that has already been named, they trade places with the player in the center and becomes "it."

### Animal Talks

*Age:* 5-7

*Needed:* bandanna

*Procedure:* People need to stand in a circle. One person needs to stand in the middle of the circle. That person is blindfolded and turns around 3 times. When he/she is finished they point to a person in the circle. The person from the circle goes to the person in the middle and makes the sound of any animal. The person in the middle needs to guess who made the sound. They get three guesses. You pick the next player so everyone gets a turn.

### Indian Chief

*Age:* 6 +

*Procedure:* Everyone sits in a circle. One person is chosen as the guesser and is sent away from the circle so they cannot see. The counselor chooses a chief by pointing at someone. Everyone starts to clap his or her hands in a rhythm. The guesser comes into the center of the circle and stands so he/she can look all around. Whoever is the chief chooses a new motion (say slapping their legs) and everyone follows and tries not to let the guesser know who the chief is that is changing all the motions. The guesser has 3 tries. The game is over when the guesser guesses incorrectly all three times or if the guesser finds the chief. The chief is the new guesser either way.

### Owl ears

*Age:* 5+

*Procedure:* Have everyone stand in a line shoulder to shoulder, all facing one direction. The "owl" moves away from the line and stands with his/her back to the line. He/She should be far enough away so he/she cannot see anyone in the line out of the corner of his/her eyes. The people in the line take turns making some kind of noise when signaled by the leader, (with hands, voice, clothing, etc.). The owl then turns around and points to the person he/she thinks made the sound. If he/she is correct, he/she turns around and someone else makes a noise. If he/she is wrong, the person who made the noise becomes the next owl. It is very important to have only one person at a time make a noise. All others must stay very still and quite so as not to confuse the owl, or he/she won't have a chance.

## Squirrel and Nut

*Ages:* 3-8

*Needed:* Thimble or Chalk. Or any other comparable size item

*Procedure:* A player is chosen to be the Squirrel and another to be the “Guesser.” Everyone else lines up facing the “guesser,” with their hands behind their back (opened). The Squirrel walks behind the group pretending to drop the Nut into everyone’s hand as he passes, but he only puts the nut in one person’s hand, trying to conceal their identity. The “Guesser” has 3 tries to figure out who has the nut. Make sure everyone gets a turn.

Suggestion: If you have enough people form two lines and have Team 1 try to guess who has the nut on Team 2, only 1 guess. If correct you get two points, if wrong you lose two.

## Common Nature Myths

### Bats:

**Bats fly in your hair:** Bats try to stay away from humans. They don’t swoop at us, but they may get close when they are catching an insect!

**All bats carry rabies:** Bats can carry rabies, but only a very small percent. The chance of getting rabies from bats and deer are about equal.

**Bats suck blood:** That is true in some countries, but not in North America. In fact, all 11 species of Ohio bats feed on insects.

**Bats are blind:** Bats can see just as well as we can, but their sound radar is used for searching prey.

### Other Mammals:

**Coyotes howl on a full moon:** That may be true, but it is not a preference for them. They would equally howl any other night as well.

**Raccoons wash their food before eating it:** It is debated by many scientists that this is not true; that raccoons are simply searching for food in the water, or perhaps getting their hands wet so they are more sensitive to the touch.

### Arthropods:

**Dragonflies can sting:** Dragonflies will tip their abdomen up and down, and may look dangerous, but they can’t deliver a sting. They can bite though!

**Daddy-long legs or Harvestmen are very deadly, but don’t have the mouthparts to deliver it to humans:** Daddy-long legs in our area feed on plant sap, dead material, and small invertebrates. They do not have venom glands, although some can secrete a chemical on their body to ward off predators.

**Chiggers bury themselves in our skin:** Chiggers are ecto-parasites, which means they feed on the outside of their hosts. When they feed, they inject an agent into our skin that facilitates the chigger’s feeding, much like forming a straw. When chiggers leave, this straw, called the *stylosome*, gets left behind and irritates us.

**Chiggers can be killed with fingernail polish:** True, if you are early enough, but many times, chiggers have left the feeding site before the itching even begins. Applying fingernail polish does, however, keep the victim from scratching, which decreases the irritation, allowing it to heal faster and itch less.

**Black widow and brown recluse spiders can kill you:** True, if you are very young or elderly, or allergic, but generally, they will make you sick for a long time.

**Woolly bear caterpillars can predict bad winters:** The coloration of Isabella Moth larvae is genetic and has no correlation to weather.

#### **Frogs and Toads:**

**Frogs can give you warts:** A virus that people transfer to each other causes warts. Frogs or toads can't carry this virus. Toads look bumpy to provide them with camouflage.

#### **Snakes:**

**All snakes have fangs:** Actually, non-poisonous snakes only have lots of tiny teeth; not two big fangs.

**Snakes chase you:** Snakes are scared of humans in fear of getting eaten or harmed. Sometimes they may charge a threat a few feet, but will flee if given the chance.

**Snakes can bite their tail and make a hoop, then roll after you down-hill:** Snakes don't even have the muscles to support their body in a hoop.

**A snake doesn't die until sundown:** A dead snake may have nerves twitching, but death comes anytime.

**Snakes are slimy:** Snakes may look slimy, but they are dry animals.

**Snakes can sting with their tongue:** Their tongue is used for smelling, not stinging.

**Milk Snakes milk cows:** They are often seen in cow barns, but they search for mice, not cows.

**Snakes hypnotize their prey by staring at them:** They do slowly stalk their prey, but no hypnosis is involved.

**Snakes dig holes:** Snakes can't dig holes, but they may go in there to eat the animal that did create the hole, like a mouse, mole, crawdad, or chipmunk!

#### **Birds:**

**Birds won't care for their young if you touch their babies or eggs:** Eagles and some waterfowl don't like humans, and may abandon their nest if they feel threatened. However, most birds don't have a very good sense of smell, and can't tell if we touched their eggs or not. Even if they could, most birds would continue raising their brood.

**Owls can rotate their heads 360 degrees:** Sometimes we may think so, but owls can only turn their heads 270 degrees. If they could turn 360, their blood vessels in the neck would crimp up!

#### **Other:**

**Moss grows on the north side of trees:** Moss likes to grow in moist places, and in the US, the sun rarely shines on the north side of trees. This is why many people believe this myth. In the woods, however, the forest canopy does a good job of shading trees, enabling moss to grow wherever it can.

**Buckeye seeds are very poisonous:** Actually, these seeds are not deadly like people think. If you eat enough of them, they will give you a tummy ache, but they also taste very bad. People usually don't swallow something with a bitter taste.

Questions about these myths?

Call MetroParks' Naturalists at 937-277-4178!

# Prairie Safari

Its time to explore the flowers and grasses taller than you! Grab an insect net (provided) and search for butterflies, assassin bugs, spiders, and many other small creatures living in the prairie.

## Basic Lesson Plan:

### Introduction

Basic rules and net safety and use (partner up teams; 1 container and net per team; team size varies)

### Hike to prairie loop

What is a prairie? A habitat of native, sun-loving grasses and flowers.

How is it different from a meadow? A meadow's vegetation is introduced, mostly from Europe.

What animals use the prairie? How?

Identify poison ivy, discuss consequences

Ask the kids not to catch anything on thorny plants

Release kids and help them catch bugs

### Conclusion- in a shady part

Group gets in a circle

Go around the circle; each child discusses what they caught, gives it a name, and releases it.

Discuss benefits of insects

Invite them to come back and catch their insects again.

### Hike back to parking lot

Come again to play, bring friends/family!





# Creek Study

Enjoy an educational hike to Sugar Creek, where we will explore fossils, catch crawdads, study insects, and look for frogs and salamanders!

\*Wear shoes that can get wet or muddy!

## Basic Lesson Plan:

### Introduction

Five Rivers MetroParks basic info

“The creek is an excellent place to play!”

Basic rules (don't go ahead, net care & safety, no sandals, running, etc.)

### Hike to the creek

### Creek Introduction

Why is it important to study creeks?

What can you find in a creek?

If you were an insect, where would you hide?

Explain proper capture and handling techniques

Pass out nets

Explain what to do with caught creatures

### Creek Exploration

### Discussion

Figure out what animals were caught

Discuss why it's important to identify these creatures

Assess quality of water with biotic index

Would you have fun today if the water smelled like poop?

What can we do to keep our creeks clean?

### Hike to parking lot

Come again to play, bring friends/family!



## Background Information

### Biotic Examination:

#### Order Ephemeroptera – Mayflies

Environmental educators are more acquainted with the nymph by leading children on creek stomping escapades. Mayfly nymphs are a big hit in aquatic studies of streams. They're usually a sign of clean waters too! Unlike stonefly nymphs that have two claws at the end of their legs, mayfly nymphs only have one. Mayfly nymphs also have gills on the sides of their abdomen, whereas stonefly nymphs may have them everywhere else (legs, "arm pits", and at the tip of the abdomen) but their abdomen sides. This is an easier way to tell them apart because a powerful hand lens is required to view the number of claws. A word of caution, there are keys out there that say if three caudal cerci (the long filaments at the tip of the abdomen) are present on the nymph, then it is a mayfly nymph, whereas if only two are present, then it is a stonefly nymph. These keys are not good to use because cerci are easily broken off, and there are a few mayfly nymphs out there that have only two cerci.



Nymphs feed on dead organic material and algae. They are also well known for their sub-imago stage in their development to an adult. Most nymphs of insects are not winged, but the mayfly nymph's last instar before becoming an adult has wings. This instar doesn't last too long, but it enables the nymph to fly away from the water and go through their last growth stage to become an adult. Sub-imagos are unmistakable by their white body.



The adults are very interesting looking flying insects, with wings that are somewhat triangle shaped. The adults also have two caudal cerci, which are very long, usually longer than the insect's body. Adults don't live very long, and don't even have mouthparts for feeding

(called vestigial mouthparts). The primary function of the adults is to reproduce, which is why they only live 1-3 days. Adults seem to have synchronized emergence periods, where many mayflies can be seen by the thousands in some areas, spontaneously. Many years before Lake Erie was polluted, mayfly bodies were so abundant that it took snow shovels to remove them from parking lots. When the males emerge, they fly in large swarms, with females joining them soon after. Once the females arrive, the individual males snag a female, and they both fly off and mate. Mating often occurs in the air, and with only a few hours to wait, the female is ready to lay her eggs on the surface of the water. She may decide to attach them to objects in the water too! Each species has their characteristic egg-laying habits.

Mayflies are very important to our environment because, both nymph and adult, provide an enormous supply of food for fish. Mayfly adults can be easily preserved by pushing an insect pin through the topside of their thorax. Nymphs, on the other hand, are a bit more complicated because of their soft bodies. If pinned, they would shrivel up and turn to dust. The nymphs must be put in about 70% ethyl or other type of alcohol in an airtight container, such as a sealed vial.

## Order Plecoptera – Stoneflies

Along with the mayflies, as mentioned earlier, stonefly nymphs are very popular in aquatic studies, especially in clean water, where they are most abundant. Even though they look very similar to mayfly nymphs, there are a few easy ways to differentiate the two.



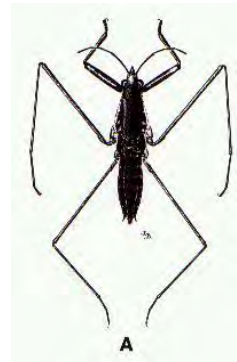
Unlike mayfly nymphs that have one claw at the end of their legs, stonefly nymphs have two. Stonefly nymphs also do not have gills on the sides of their abdomens (mayfly nymphs do), but rather have them at the appendage joints. This is an easier way to tell the two orders apart because a powerful hand lens is required to view the number of claws. A word of caution, there are keys out there that say if three caudal cerci (the long filaments at the tip of the abdomen) are present on the nymph, then it is a mayfly nymph, whereas if there are just two, it is a stonefly nymph. These keys are not good to use because cerci are easily broken off, and there are a few mayfly nymphs out there that have only two cerci.



Although the nymphs of mayflies and stoneflies may be difficult for beginners to differentiate, the adults of the two orders are quite different. The adult stonefly has two pair of wings, all folded neatly over the abdomen, flat against the back, whereas the adult mayfly holds its wings upright over the abdomen, with the wings sticking out and away from the back, just like damselflies. Adult stoneflies can be found in the winter, flying about, and even crawling on the snow!

Both stonefly nymphs and adults are soft bodied, and are best preserved in 70-75% alcohol.

## Family Gerridae – Water Striders



Many people think of these animals as “water spiders”, but they are insects, with each pair of legs having a special function. The first pair of legs bears very small, but sharp hooks, which are used to capture and detain prey. The second pair of legs are used for propulsion, acting as oars on a boat. The last pair of legs act as rudders to serve for steering of the insect when skimming across the water. If you look closely, there is a noticeable indentation of the water below each foot! This is because water striders utilize the properties of water surface tension to stay on the water surface. They are not floating, but rather are walking on water! Their feet do not break the surface tension because they are covered with tiny little hairs.

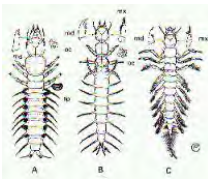
These same hairs also cover the strider’s body, helping to keep it dry! Water striders are very difficult to get wet for this reason. These insects also have wings, which they use to travel to different water sources for food, which are small aquatic animals. They can detect these small animals by reading the water ripples with their feet, much like a spider reading the vibrations of its own web! The water striders lay their eggs at the surface of the water on floating objects. These insects can inflict a painful bite, so caution must be used when handling.

## Family Corydalidae – Dobsonflies and Fishflies



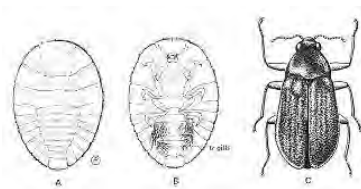
These insects are over 2.5 centimeters in length (about one inch) and are usually found near water of very good quality. The adults appear to be quite dangerous; especially the males because they bear very large pincer-like mandibles. These mandibles, however, are actually quite harmless. In fact, they are so large that the insect has trouble controlling them. The primary purpose of the mandibles is to attract females for mating.

The dobsonflies are the largest members of this family, having *clear* wings over 5 centimeters in length. Fishflies are smaller, having wings less than 5 centimeters in length. Fishfly wings can be either clear or smoky. Corydalid adults don't eat much, if at all.



Fishermen and creek explorers often encounter the larvae of this family. Many call them hellgrammites. They look somewhat like large centipedes, but are dark in color. Be cautious; their jaws can inflict a painful bite!

## Family Psephenidae – Water Penny Beetles



the larvae are found.

This group of insects is well known for their larvae, which are shaped like circular disks, looking much like penny's. Water-pennies are considered a sign of high quality water. The adult is a black, somewhat flattened beetle that is about 4-6 mm in length. They are found on stones in the water close to the shore wherever

## Family Tipulidae – Crane Flies

"Ooh, look, a male mosquito!" is the commonly heard exclamation when encountering a crane fly on a hike. Male mosquitoes are actually about the same size as female mosquitoes, and are not often encountered because they don't drink blood (see the mosquito section for more details). The big, mosquito-like insect flying around is merely a crane fly; harmless to humans. Use care when handling them because their legs are easily broken off.

Most larvae are aquatic, but a few live in soil or decaying wood. Most of them eat decaying plant material, but a few of the aquatic larvae are predaceous. The adults only live for a few days, most not even feeding. Those that do feed usually feed on nectar from flowers.

The crane fly is a good specimen to use for halter observation. They are located just behind the wings. All flies have these, and are used as balances which aid in their awesome maneuvering capabilities.

## Family Culicidae – Mosquitoes

This family is one of the most well known groups of insects on this planet, and is probably the most responsible for the ease of European settlement by transmitting diseases. Despite all of

the bad things people think about mosquitoes, they provide an ample food supply for fish and bats!

The larval form of mosquitoes is aquatic, but they obtain their oxygen from the air. Some of them have breathing tubes that act like straws to get air from beneath the surface. Others stick the end of their abdomen through the surface up into the air. Mosquito larvae provide food for many aquatic animals, including fish and frogs!

The adult females are the insects that bite humans. They need the protein in our blood for their egg production. Most females only have to bite once, so the chance of being bitten by a mosquito that has bitten another human is tremendously slim. This is one of the reasons why mosquitoes are not known to transmit HIV or Hepatitis. What about Malaria? Malaria is caused by a protist (*Plasmodium sp.*) which uses the mosquito as a host for a part of its lifecycle! Without the mosquito, malaria wouldn't even exist!

Many believe that adult male mosquitoes are very large, and do not bite humans. They are partly correct in that they do not bite, but the insects they are probably thinking about are crane flies, mentioned earlier. Male mosquitoes are about the same size as the females, but don't have a blood meal. They do, however, feed on sap, just as the female does, aside from her blood meal.

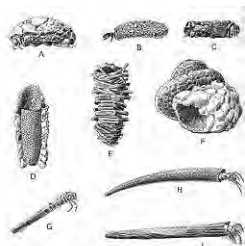
### Family Chironomidae – Midges

These insects are quite abundant, and come in a variety of colors. They look quite like mosquitoes unless examined closely. There are other families containing midges, but this is the group better studied, containing more than 760 North American species. Midge larvae are aquatic, and are used in assessing water quality on many biotic indices. Larvae of many species are red, because their blood contains hemoglobin. This reddish color gives them the name "bloodworms", and can be purchased at local pet supply stores for use in fish aquaria. Midge larvae are a very important link in the food chain.

### Order Trichoptera – Caddisflies

Almost every interpreter knows what caddisflies are, and how much interest they can bring when visitors find out they build their own houses. Many naturalists believe that the „house making“ quality is a characteristic of all caddisflies, but there are quite a few larvae that don't build homes. All larvae, inside homes or not, are caterpillar-like, with a well-developed head and thoracic legs. They also have a pair of hook-like appendages at the end of the abdomen. The abdomen has filamentous gills used for gas exchange.

Larvae that do build cases to live in make them out of leaf parts, sand, pebbles, twigs, or any other materials. Each species has its own design and materials that it uses. This enables scientists to identify the larvae by the „house“ without even seeing the larvae! All case building larvae are plant eaters.

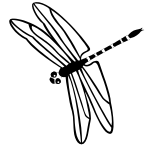


There are some larvae that make silk nets to catch small critters and floating plant material. The larvae then eat these organic materials. They are able to make these nets with silk spun from modified salivary glands.

Adult caddisflies are not often encountered. They have four membranous wings that are rather hairy, and are held roof-like over the abdomen when at rest, like grasshoppers.

Caddisfly larvae are best preserved in 70% ethyl alcohol, but 70% Isopropyl will do fine for a while. The pigment of the caddisflies, especially the more greenish ones, tends to become dissolved into the alcohol, turning it a greenish tinge.

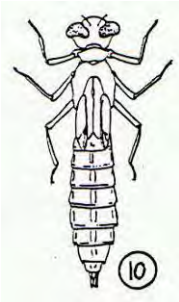
## Pond insects, but could be seen in creeks:



### Order Odonata – Dragonflies and Damselflies

Dragonflies and damselflies are very entertaining for anyone watching their behavior! How they are able to fly around and catch other flying insects with their basket-like legs and eat them in mid air is really astonishing. Take a look at their legs and notice all of the fine hairs which, when the legs are held properly, create a net to catch smaller insects!

There is a large difference between dragonflies and damselflies. So big of a difference that science places them in different suborders. Speaking for the adults, dragonflies, in the suborder Anisoptera, are usually larger than damselflies, in the suborder Zygoptera. Dragonflies are fast fliers; it is not uncommon to see a dragonfly flying beside your vehicle at 35-40 mph! Dragonflies are also capable of changing directions of flight at incredible speed, so fast that they can easily turn, and outrun a net coming to capture them, even when the capturer uses two hands and swings the net as fast as we can! When at rest, dragonflies hold their wings out. They are not able to fold them back over their abdomen like the damselflies. Also, look at the dragonfly's head. They are roundish, with very big compound eyes! In fact, the eyes make up most of the head! They need these large eyes to find out where to catch its prey!



Dragonfly niads (niad meaning aquatic nymph), pictures 10 and 11, are also bigger than the damselfly niads. Once caught, turn the niad upside down and take a good close look at that "mouth"! Bend the "mouth" gently outward to notice the two little hooks on it. This "mouth" is designed to be very efficient in catching prey, seizing at a 100<sup>th</sup> of a second! Another thing to notice about dragonfly niads is how they move. Sometimes they will move forward a couple of inches, without even moving their legs! They do this by quickly expelling water out of their abdomen. Dragonfly niads' gills are located within the abdomen, so in order to breathe, the niads must "inhale" the water into their abdomen, then expel it, usually very quickly, which propels them forward! Damselflies do not have this capability, being that their gills are external, located at the tip of the abdomen.

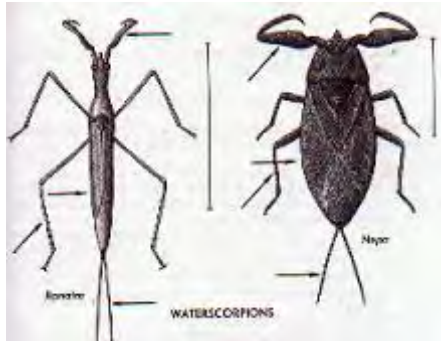


Adult damselflies usually have a slow, fluttery flight, and always hold their wings over their abdomen when not in use. Their wings are very narrow at the base of the thorax, whereas dragonflies are wide. Also, their head is quite small compared to the dragonfly, but their eyes make up a big part of it. They are located at both ends of the head, making them look like hammerhead sharks! This is called a transversely elongated head! Damselfly niads are much

thinner than the dragonfly nymphs, and also are usually a brighter greenish color. They are also predators, which feed on small crustaceans and other animal life in the water.

The members of Odonata are very good with catching the eye of the public. To introduce the species to a group, capture one and perch it onto your finger. Once it grabs a hold of your fingertip, it will usually set on it for about 10 seconds before it flies away. This sets a perfect learning environment for studying the characteristics of the order.

### Family Nepidae – Waterscorpions



Water scorpions are aquatic predacious bugs that are long and slender, with the first pair of legs bearing very sharp hooks used in detaining prey. At the tail end of the insect, there are two cerci which connect together and make a breathing tube! When this insect wants a breath of air, all it has to do is stick his cerci into the air, and its respiratory organs take care of the rest! This is much like humans using a snorkel! These insects also have wings, and can fly, but seldom do. Instead, they move very slow in the water, waiting

for a nice juicy meal to come their way, such as small tadpoles, fish, other aquatic insects, and crustaceans! When it is time for the female to lay eggs, she inserts them into plant tissue.

Nepids can inflict a painful bite if handled improperly, but handling them the correct way is quite easy; just pick them up by the base of the thorax, between the second and third pair of legs. The front pair of legs can't hook you from this location.

There is another type of water scorpion in Ohio that is not as common as the slender one (*Ranatra sp.*), which belongs to the Genus *Nepa*. It is somewhat flattened and oval-shaped, but still has the hooked front legs and breathing cerci.

### Family Belostomatidae – Giant Water Bugs



The largest bugs in the order belong to this family, some in the US being 65 mm in length! There is even a species in South America that is more than 100 mm long! These bugs are somewhat flattened and oval-shaped, with the first pair of legs bearing hooks used to spear anything from small insects to crustaceans, to tadpoles and small fish! They are very common in ponds and on the edges of lakes, where they are easily caught by aquatic nets.

They have wings, and frequently leave the water and fly about because they are very attracted to lights. Sometimes they are called the electric light bugs, and so often people don't even realize that they are primarily aquatic life forms.

When they swim close to shore or in a tank, take a look at their body, especially under the wings, and notice the light reflective properties; being very shiny. These are air bubbles, trapped underneath the wings by very small hairs. These bubbles contain oxygen which the bug breathes from! Water bugs don't have gills, so they must get their oxygen from the air. When they dive, they take some air with them, just like their own oxygen tanks!

Water bugs are often the host of mites, which attach themselves on the ventral surface (belly) of the bug. They are a bright reddish color, and are not difficult to miss. Water bugs lay eggs in a few different ways. Some lay their eggs on the back of the male, and he carries them around and protects them until they hatch! Other water bugs may just attach them to aquatic vegetation.

When handling giant water bugs, hold them by the abdomen in order to avoid the beak and the first pair of legs.

### Family Corixidae – Water Boatmen



These are interesting little aquatic creatures that look like tiny rowboats moving below the surface of the water. What may look like oars are actually the hind feet of the insect. These feet have tiny hairs fringed together to make a larger flat surface that acts as an oar! There are about 120 species of water boatmen in the US, which feed on algae and other tiny organisms. A few are predaceous, feeding on small insect larvae and crustaceans. Unlike other aquatic bugs, water boatmen will not bite people. The eggs of water boatmen are usually attached to aquatic plants, which many Mexicans enjoy harvesting.

They collect them from the plants, dry them, and then ground them into a flour!

Water boatmen can fly, but are more often seen swimming in the water. Since they lack gills, they carry air underwater with them so that they have a breathable oxygen source. Water boatmen are an important food source for many larger animals in the water.

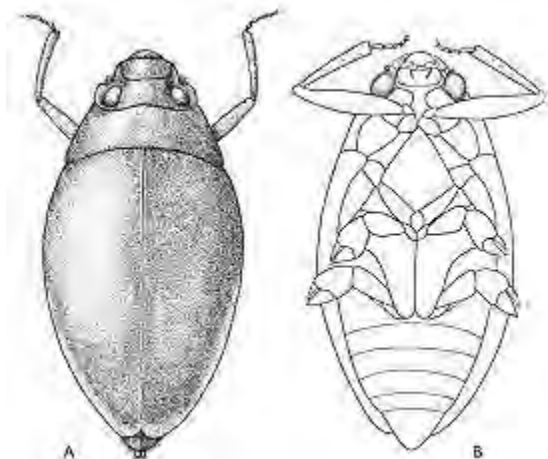
### Family Notonectidae - Backswimmers



There is no mistake on where these creatures get their name. They look much like water boatmen, but swim bellyside up! There are 34 species of backswimmers in the US. Since they lack gills, they carry air underwater with them so that they have a breathable oxygen source. One of the distinguishing characteristics from the water boatmen is that the backswimmer's head is much smaller, with smaller eyes. Backswimmers frequently attack animals larger than themselves, latching onto them, piercing the skin, and sucking out body juices. A common method of capturing prey is by drifting upward under the prey after releasing hold of

a submerged plant, then capturing it. Unlike the water boatmen, these insects will bite people when handled, feeling much like a bee sting. During courtship, males often rub their feet against their mouthparts, making a sound that attracts the females of the species!

### Family Gyrinidae – Whirligig Beetles



These oval, black beetles are commonly seen swimming in groups on the surface of ponds and quiet streams. When they swim, they appear to have no destination, moving around on a small area of the pond, never in a straight line, and very fast. They are scavengers, feeding chiefly on insects that fall onto the surface of the water. This family is unique to other beetles in that they have their pair of compound



eyes divided; a section under water, and a section above the water's surface! This allows the insect to see the air and water at the same time! Gyrinids can be handled with a certain degree of safety, because they rarely bite humans. Many will give off a fruity odor when handled.

The larvae of these beetles are predaceous, feeding on a variety of small, aquatic animals, including each other. They hatch from eggs laid in clusters or rows on the undersides of the leaves of aquatic plants. Pupation occurs in structures the larvae make out of mud, which are located on the shore attached to aquatic plants.

## Fossils:

Fossils are the remains of past life. They can include a wide variety of things like plant parts, animal parts, and even footprints. Under special conditions, an imprint left by a plant or animal may also become fossilized. Fossils are the only clues we have to the nature of life in Montgomery County millions of years ago. Different layers of rock contain different types and ages of fossils and reveal an Ohio startlingly different from the one we live in today.

How are fossils formed? Normally only plants or animals with hard parts are preserved as fossils. When a plant or animal dies, it must be buried quickly to prevent damage and must remain undisturbed during the long process of fossilization. Often, hard parts are replaced by minerals such as lime, silica, or pyrite. Sometimes this replacement preserves the detail of the original plant or animal. In other cases, just the general form is preserved. Because very special conditions are necessary for fossilization to occur, complete fossils of animals or plants are rare.

Where are fossils found? Southwestern Ohio's counties are littered with fossils. They are in the stone our driveways and in the walls of the State House in Columbus. They are abundant along stream beds and in exposed rock. Today, scientists and collectors from around the world search for remains of life in the rich fossil beds located here. The fossils found in MetroParks come from the Ordovician Period (450 million years ago) and the Silurian Period (425 million years ago). These include the brachiopods, bryozoans, trilobites, horn corals, cephalopods, crinoids, and gastropods.

The fossils you'll find in MetroParks are the remains of animals who lived only in warm sea water. What this tells us about Ohio's past is amazing. When you spot these fossils, realize that millions of years ago the very spot you are standing on was covered with ocean water teeming with life! Although no longer covered with sea water, the surface of Ohio is still slowly but constantly being changed by wind and water. What do you think Ohio might look like a million years from now?



**Brachiopods:** At first glance, brachiopods look a little like clam shells. They are one of the most abundant kinds of fossils found in Montgomery County. The animals that lived in these shells burrowed in the mud on the sea bottom or attached themselves to the sea floor by means of a fleshy stalk. Brachiopods can still be found in the oceans of the world today.



**Bryozoans:** Bryozoan fossils are abundant in Montgomery County's Ordovician rocks. Bryozoans were tiny animals that joined together by the thousands to form colonies resembling fans or twigs. At times, the bottom of the sea in Ohio was covered with huge colonies occupying every available surface.



**Horn Corals:** This common Ordovician coral resembles a cow horn. Unlike most corals which live in colonies, horn corals were solitary creatures. They lived attached by their pointed end to the ocean floor. Extending from their upper end were fleshy tentacles that waved food into their mouth. Although horn corals are extinct today, their relatives include modern corals and sea anemones.

**Crinoids:** Although crinoids are often called "sea lilies", they were not flowers but animals. A stem anchored the animal to the sea floor and fleshy arms helped guide food into its mouth. The stem, which resembles a stack of tiny life-savers, is the most commonly found crinoid fossil. "Flower heads" are rarely found. Crinoids that exist

today are often beautifully colored and grow in colonies on the ocean floor. They are related to the starfish and sand dollar.



**Cephalopods:** Cephalopods lived inside straight or coiled shells divided on the inside into compartments. Modern day squid, octopi, and devilfish are related to these once abundant predators of Ordovician and Silurian seas.



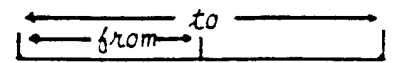
**Trilobites:** The trilobite has the honor of being Ohio's state fossil. Trilobites were sea creatures characterized by a hard outer skeleton divided into three sections by two grooves which ran from head to tail. The largest complete trilobite fossil ever found was discovered near Huffman Dam. The "Huffman Trilobite" measures 14 ½" x 10", but most trilobite fossils are less than an inch in length. When found, they are often curled up into balls. Crabs, spiders and insects are the present-day relatives of the now extinct trilobite.



**Gastropods:** Gastropods are simply fossil snails. They had a single shell that was usually coiled, a broad muscular foot and a well-developed head with eyes, mouth and tentacles. The land and water snails of today are related to these inhabitants of ancient seas.

# KEY TO THE STREAM-DWELLING MACROINVERTEBRATES

ACTUAL SIZE RANGE



GO BELOW TO

(1) Body wormlike, may or may not have legs;  
if legs present, they are not distinct

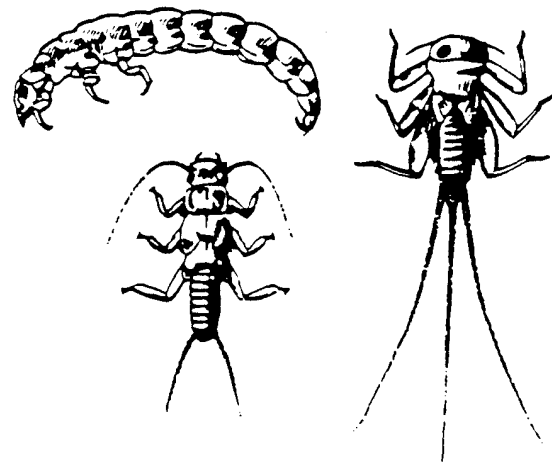
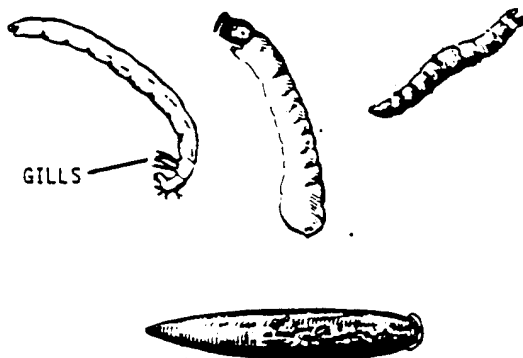
2

(1) Body not wormlike, or if wormlike has  
distinct legs

6

WORMLIKE

NOT WORMLIKE



(2) Body with no legs, without distinct  
head region

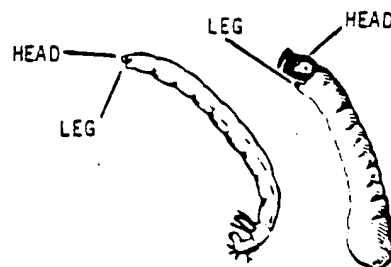
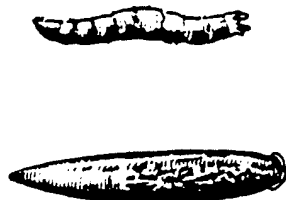
3

(2) Body with very small, indistinct legs,  
with distinct head region

5

NO LEGS

LEGS



(3) Body with large suction disc at each end; body segmented

LEECHES (Hirudinea)



(3) Body without a suction disc at either end

4

(4) Body black or brown; more than 1/3 inch long; plump and caterpillar-like

CRANE FLY LARVAE (Tipulidae)



(4) Body thin and earthworm-like; usually less than one inch long

AQUATIC WORMS (Oligochaeta)



(5) One end of body wider than other end

BLACK FLY LARVAE (Simuliidae)



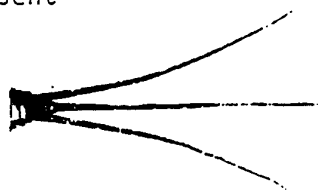
(5) Both ends of body almost same width

MIDGE LARVAE (Chironomidae)



(6) Thin hair-like tails present

7



TOP VIEW

(6) Tails absent, or if present, broad and oar-like

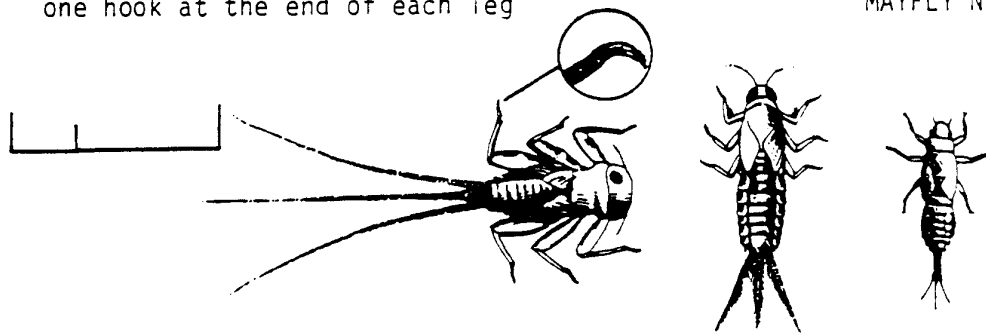
8



SIDE VIEW

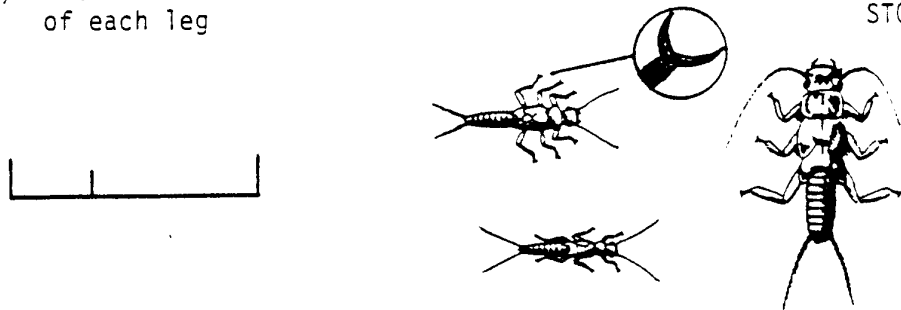
(7) With three tails (occasionally two) and one hook at the end of each leg

MAYFLY NYMPHS (Ephemeroptera)



(7) With two tails and two hooks at the end of each leg

STONEFLY NYMPHS (Plecoptera)



(8) Body beetle-like; with legs

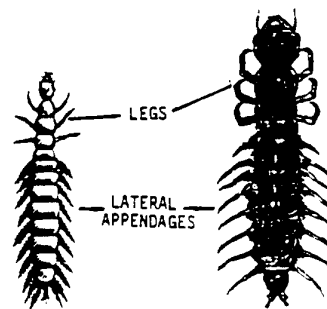
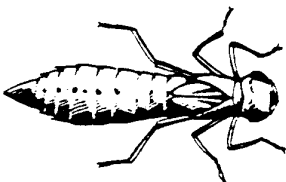
ADULT RIFFLE BEETLE (Elmidae)



(8) Body not beetle-like; with or without legs 9

(9) Body generally long and cylindrical, with six legs (DO NOT CONFUSE LATERAL APPENDAGES WITH LEGS)

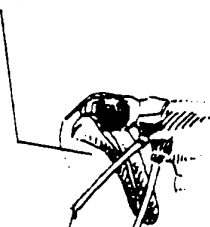
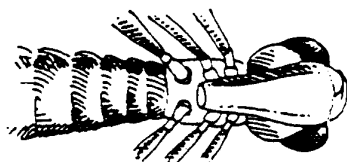
10



(9) Body not as above; or if cylindrical, with more than six legs 15

(10) With a hinged plate-like lower jaw (labium) 11

BOTTOM VIEW



(10) Not as above 12

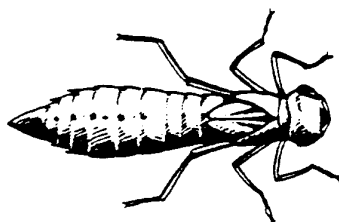
(11) With three broad, bar-like tails (tails break off easily)

DAMSELFLY NYMPHS (Odonata: Zygoptera)



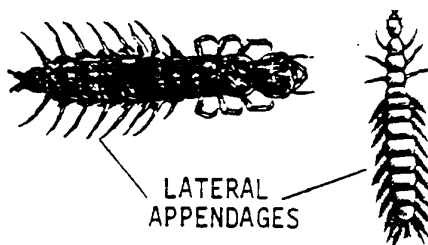
(11) Without broad oar-like tail

DRAGONFLY NYMPHS (Odonata:  
Anisoptera)



(12) Hair-like or tentacle-like lateral appendages extending from side of body (usually longer than body width)

13

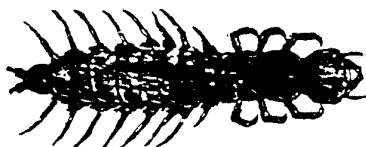


(12) No such appendages

14

(13) Body dark colored; usually more than 1/2 inch long

DOBSONFLY LARVAE (Hellgrammite)  
(Corydalidae)



(13) Body light brown, white, or other light colors; less than 1/2 inch long

BEETLE LARVAE (Coleoptera)

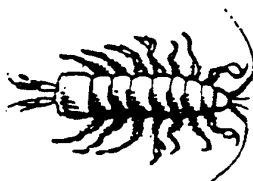


(18) Body much higher than wide



SCUDS (Amphipoda)

(18) Body much wider than high



SOWBUG (Isopoda)

(19) Body shell composed of two hinged parts

L..... to 5 in.

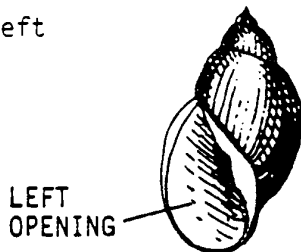


CLAMS (Pelecypoda)

(19) Body shell singular and coiled

SNAILS (Gastropoda) see 20

(20) Shell opening on left



POUCH SNAILS (Physidae)

(20) Shell opening on right or in center

OTHER SNAILS



RIGHT  
OPENING



CENTRAL  
OPENING



(14) One or two hooks or claws at or near end of abdomen



CADDISFLY LARVAE (Trichoptera)

HOOK

(14) Not as above



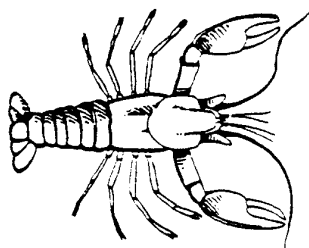
BEETLE LARVAE (Coleoptera)

NO HOOK

(15) With two large claws and eight legs

CRAYFISH (Cambaridae)

..... to 6 in.



(15) Without claws; legs variable

16

(16) With six or more legs

17

(16) Legs absent; body covered by a shell

19

(17) Body saucer-shaped; about the diameter of a pencil eraser



TOP



BOTTOM

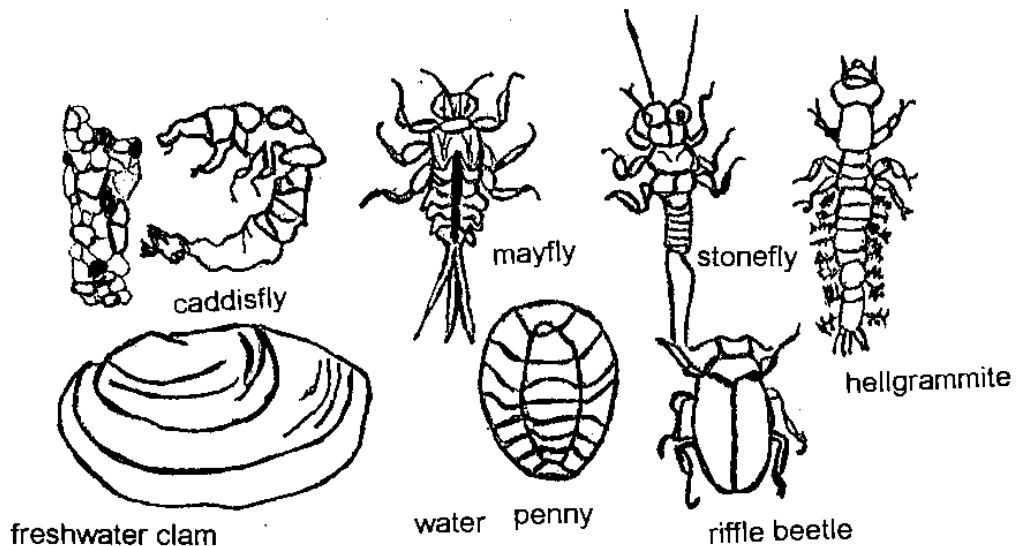
WATER PENNY BEETLE LARVAE (Psephenidae)

(17) Not as above; with more than six legs

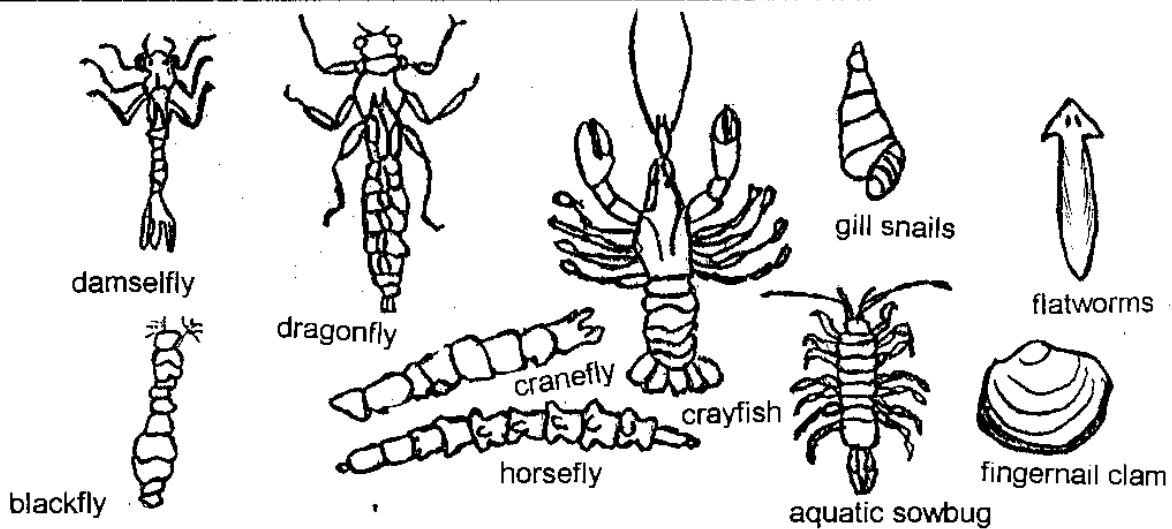
18

# Biotic Index

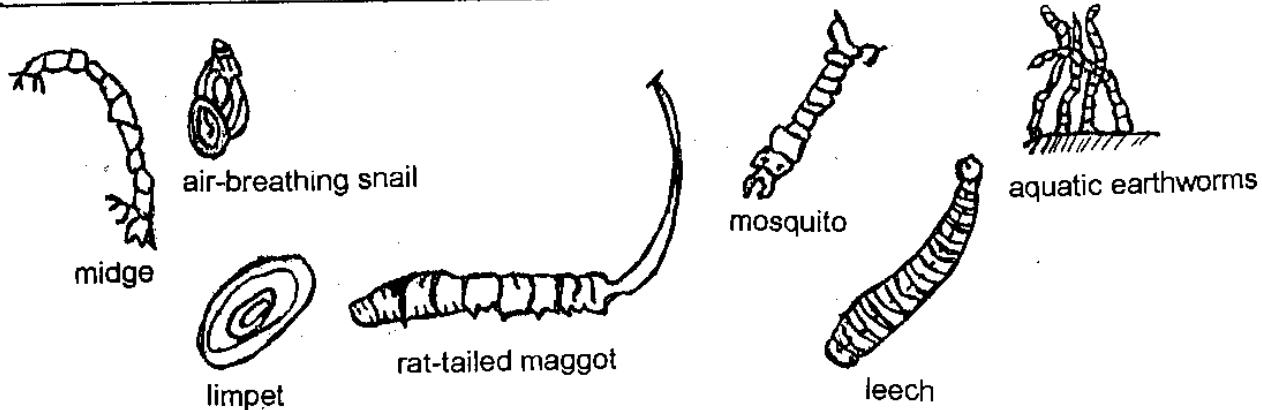
C  
L  
A  
S  
S  
  
1



C  
L  
A  
S  
S  
  
2



C  
L  
A  
S  
S  
  
3



Biotic Index = 2(#1) + (#2)

If only class 3 organisms are collected, the index value = 0

The lowest value for a "clean" gravel bottomed area is 15; for a mud or sand bottomed area 10-15