Implementing a Watershed Workshop at Camp Albemarle

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Abstract:

For our project, we addressed the public in the Charlottesville area concerning how their actions directly affect the Chesapeake Bay. Specifically, our objectives included implementing a watershed workshop at Camp Albemarle (an environmental camp for elementary-aged students) in which we worked with four different activities: benthic macro-invertebrate stream monitoring, an enviroscape, a soil-box erosion experiment, and a nature trail.

With these activities, we were able to test the children's knowledge of watersheds in general and relate this information to their local area. We did this by asking the children questions before and after each activity to see how much they learned, and by phrasing our questions within the context of the local Rivana Watershed.

On two separate occasions we worked this camp with home-schooled students in the area, as well with an Albemarle public school. Both of these groups consisted of fourth graders preparing for their SOLs (of which watersheds and the scientific method are a part).

We believe our objectives successfully accomplished our goal of improving each child's awareness on how their individual actions can create pollution that can filter into the Rivana Watershed, as well as specific preventative methods to ensure environmental sustainability.

Introduction:

The Chesapeake Bay is in danger from high amounts of pollution. This body of water provides the East Coast with not only sources of food, but it also provides jobs from water-centered industries. According to the Chesapeake Bay Foundation, "nitrogen and phosphorus pollution causes algae blooms that block sunlight to underwater grasses and remove oxygen from the water, creating "dead zones" -- areas of the Bay that have too little oxygen to support a healthy ecosystem." So much of the pollution that affects the Bay is caused by human actions and choices that can be modified to promote healthy environmental development. The Chesapeake Bay Foundation also stresses that the "top sources of these pollutants include agriculture, sewage treatment plants, runoff from urban and suburban areas, and air pollution from automobiles, factories, and power plants…[as well as] sprawl, toxic pollution, and poor fishery management," all of which are human driven problems. There are numerous education initiatives targeting students but we feel that they are missing a meaningful hands-on component that would give young people a feeling that they had a stake in the health or illness of the Chesapeake Bay. It is essential to help clean this bay and lessen the pollution. The grass roots solution of this problem is education of our younger generations on how their actions in their homes indirectly influence the health of the bay through watersheds. According to Place-based Education: Connecting Classroom and Community, a scholarly article by David Sobel,

> "Emphasizing hands-on, real-world learning experiences…increases academic achievement, helps students develop stronger ties to their community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens."

What is lacking is meaningful education of young people, who in their elementary years are at a crucial point of development when educators have a unique opportunity to impress upon them the consequences of their actions.

Approach:

Originally, our project was to address educating to 4th grade students about the importance of watersheds. We chose 4th grade students because it correlated with the SOLs and we felt that introducing these children to sustainability efforts at such a young age would help them grasp the concept better and make sustainable choices throughout their life. Our original plan was to present the information in an interactive format in the classroom. We would present the class with an interactive test to test their initial knowledge about conservation and pollution of water, as well as the water cycle. This way, we could determine at the end of the project, how much the children actually learned.

After the test we had planned activites in order to educate them on the severity of human impact on the watersheds and how we can curb our impact. This would be done through the Enviroscape, a lively powerpoint, and arts and crates (such as making the signs “don’t dump here” or “this leads to the bay” in order for the students to remind each other of conserving water). We also planned to have a box-turtle mascot so that the kids would have a live animal to correlate with their new education and in this aspect, we would hope that seeing an animal that lives in the watershed would help them conserve water. In order to accomplish this, we got in contact with Lindsay Snoddy, the Environmental Compliance Manager for Albemarle County

Public Schools. She got in contact with teachers in the Public School system and discovered that, in order to cover the watershed topic, all of the public schools went on a field trip to Camp Albemarle, that is part of the Thomas Jefferson Soil and Water Conservation District. Lindsay Snoddy then put us in contact with the leader of the activities, Martin Johnson. We decided to change our project, only minimally, but keep our initial goals and in criteria for success order to educate about the importance of watersheds.

Our criteria for success included the ease of project implementation and ease of child participation– we did not wish to take on a project that would take up so much time that we would not be able to focus on our other classes and we also did not wish to present materials to children that was too challenging; we wished that they would participate in each activity. We also wished to have a manageable student – to – teacher ratio in order to insure that the children were able understand the information and participate in the activities. In order to make sure that the children learned the information, we decided that we would ask the children questions before and after each station and see if they could correlate the information they had learned. In order to have success, we needed access to local materials at an inexpensive cost and to make sure that our project not only satisfied the community partner's needs and desires, but also that the information was prevalent to the appropriate school's SOL curriculum. Finally, our last criteria of success was that the material was interesting to students and that they had fun in a safe manner.

With our goals and criteria outlined, we worked with the Thomas Jefferson Soil and Water Conservation District at Camp Albemarle to educate elementary school-age children about

the local watershed systems. Our approach addresses the environmental degradation of the Chesapeake Bay and the lack of awareness of how human action affects it. We first volunteered at Camp Albermarle for the day-long programs in October in which we educated children about the local river systems, local flora and fauna, macroinvertbrates, and pollution management. Camp Albemarle was our most feasible project idea and met the community's needs. Camp Albemarle is unique among the four different approaches in that our project would fit in smoothly with the Camp's current activities. It is already used as a day-long field trip for students to fill their state-required "meaningful watershed experience." The camp already employs several loose lesson plans for the day. Therefore, it will be very easy to adapt our project to the camp's curriculum. This provides a very high ease of implementation, accessibility of local materials, timing, and a very low cost. At the same time, their loosely designed lesson plans allowed us to be creative in how we teach the information to the students. This is a very important advantage that the camp provides: we are not only focusing on imparting information to students, but also engaging the students in a fun and effective way.

Other advantages of Camp Albemarle were the student to teacher ratio and its satisfaction of the community partner's needs. The groups that visited the camp are small, typically between 50 and 75 students. Those students are then split into three groups that move between activities throughout the day. Two instructors led each activity. This keeps the student to teacher ratio at a very low and effective – the children seemed to react well to the low amount of instructors. Working with Camp Albemarle satisfied the community partner's desires as the camp is constantly in need of volunteer instructors.

Matrix:

Criteria	Classroom Workshop	Field Trip to Elizabeth River	Watershed Workshop at Camp Albemarle	After-school Kid's Program or Club
A. Ease of project implementation	1	0	1	0
B. Ease of child participation	1	0	1	1
C. Student-to-teacher ratio	1	0	1	0
D. Accessibility of local materials	0	0	1	0
E. Environmentally Friendly	1	1	1	1
F. Satisfies community partner's needs and desires	1	1	1	1
G. Relevant to curriculum	1	1	1	1
H. Interesting to Students	1	1	1	1
I. Fits into time constraints	1	0	1	0
J. Safety	1	0	1	1

Cost	1	0	1	0
Total	10	6	12	7

According to the matrix, the Watershed Workshop at Camp Albermarle was the most effective project idea for addressing our project definition. Camp Albemarle was unique among the four different approaches in that our project fit in smoothly with the Camp's current activities. Camp Albemarle was already used as a day-long field trip for students to fill their state-required "meaningful watershed experience." Beginning in 2005, the Virginia Department of Education mandated that every school district "provide a meaningful bay or stream outdoor experience for every school student in the watershed before graduation from high school." The program seeks to prepare students for an environmental science portion on the SOL (Standards of Learning) state exam. The camp already employed several loose lesson plans for the day. Therefore, it would be very easy to adapt our project to the camp's curriculum. This provides a very high ease of implementation, accessibility of local materials, timing, and a very low cost. At the same time, their loosely designed lesson plans allowed us to be creative in how we taught the information to the students. This is a very important advantage that the camp provided: we were not only focusing on imparting information to students, but also engaging the students in a fun and effective way. Other advantages of Camp Albemarle were its student to teacher ratio and satisfaction of the community partner's needs. The groups that visited the camp are small, typically between 50 and 75 students. Those students were then split into three groups that moved between activities throughout the day. Each activity was then led by two instructors. This kept the student to teacher ratio at a very low and effective. Working with Camp Albemarle also

satisfied the community partner's desires as the camp was constantly in need of volunteer instructors.

The matrix aside, the purpose of Camp Albermarle and the "meaningful watershed experience" program fit well with our goals for the project. Camp Albermarle not only educates kids about the local watersheds, but takes them out of the classroom and engages them with the outdoors. We felt that teaching this way would establish an emotional connection between the kids and the nature they were exploring. Instead of just reading or listening to facts, they get to learn by getting their hands in the soil, touching the trees, and feeling the river. We passionately felt that establishing this connection in the youth was the first step in establishing watershed stewardship in the residents of Virginia. We believed that if the experience was truly meaningful, it would potentially imbue the children with a life-long affection for their local watershed and the entire Chesapeake Bay watershed.

Lindsay Snoddy originally gave us the idea of Camp Albermarle and referred us to Martin Johnson, an Urban Conservation Specialist for the Thomas Jefferson Soil and Water Conservation District. Martin became our main contact and "project mentor. Martin provided us with the materials and training necessary to run the camp's activities. He also gave us great insight on how to effectively teach the information while keeping the day fun and upbeat. On October 11th, the weekend before the first camp day, our team met with Martin at Camp Albermarle to learn how to run the camp.

The camp day consisted of three activities through which the children's groups rotated. The first activity was the "enviroscape." The enviroscape was a twenty-five inch by thirty-inch three-dimensional model of a suburban city. It consisted of different sections of a conventional American town: a residential neighborhood, construction site, industrial plant, mountainous forest where clear-cutting had occurred, highway, and farmland. The topography undulated with the different aspects of the model. It also contained a meandering river bed which emptied into a lake at the bottom of the model. We began this station with a discussion of what a watershed is and how it is connected to the clean water we use. We related the health of their local streams and waterways to the cleanliness of the water they use for brushing their teeth and taking showers. This was a great spot for humor: "Who wants to brush their teeth with muddy water?" "Ewww!" Pollutant substances are then added to the model. Cocoa powder representing loose sediment, Cool-aid powder representing fertilizer, and soy sauce representing car oil is sprinkled on the model. We will give the materials to the children to apply where they think such materials would exist. While the children applied the pollutants to the model, we discussed where the pollutants come from and how they affect the environment. For instance, we asked the children how fertilizer negatively affects the environment. We then explained that fertilizer is basically nutrients to the help the soil grow. However, when high levels get into our streams and lakes, they cause large amounts of algae to grow on the surface of the water. Too much algae makes it hard for fish and aquatic fish to survive.

The children were then given squirt bottles to simulate rainfall on the model. As they created precipitation, we asked the students to observe how the pollutants were washed off the land, into the stream and eventually ended up in the lake. After the rainfall, the water in the

model lake changed from clear to a murky brown. The children had immediate negative reactions to the lake color. It was a simple, yet strong representation of how pollution affects watersheds. We explained how you do not always have a bird's eye view of how pollution flows through watersheds and that this makes some people blind to water pollution. We ended the activity with a discussion of how to prevent erosion, fertilizer, and car oil from reaching our water local watersheds. To prevent erosion, we described how plastic guards can be set up around construction sites to stop soil from washing away. To minimize car oil pollution, we explained the importance of seasonal check-ups to ensure the car is not leaking fluids. We also emphasized walking or biking as a means of travel instead of always relying on the car. To block fertilizer from entering streams, we advocated planting natural vegetation on the banks of streams as a buffer. Vegetation such as trees and grass catches the fertilizer, instead of allowing it to simply wash into a stream. We also discussed how natural fertilizer in the form of cow manure can also pollute water ways. We stressed the importance of fencing livestock away from the banks of streams. As we discussed these ideas, we had the students place strips of model grass and small plastic fences on the enviroscape.

The enviroscape station concluded with a short erosion experiment. It consisted of three wooden boxes all containing soil. One box held bare soil, another included a top layer of straw, and a third had grass planted into the soil. We asked the students to hypothesize which box they thought would produce the cleanest water if it rained. We then poured water into each box and had a student hold a mason jar underneath each box to catch the water that filters out. The jars were then held up for comparison. The grassy soil produced the cleanest water, followed by the straw soil, then the bare soil. We asked the students why they think the grass and straw produced

cleaner water. We explained that they both hold the soil in place and resist erosion. We described how vegetation is even more effective because it grows roots deep to hold the soil even tighter We connected the soil experiment to real life by describing that forests, like the grassy box, act as large filtration systems that clean the water and hold the soil in place. We stressed the importance of conserving our natural Virginia forests to maintain the health of our water.

The second activity was benthic macro-invertebrate stream testing. At this station, we measured the health of a stream by catching macro-organisms, essentially aquatic bugs. Stream health was determined by the abundance of environmentally sensitive and tolerant species. If the stream was healthy, it would contain a large abundance of environmentally sensitive species. If the stream was polluted, we would catch only tolerant species able to live in degraded environments.

We led the children to a sandy beach at the edge of the Mormons River at the south end of Camp Albermarle. We asked the students to describe the river: is it dirty or clean and what types of animals they think lived in the river. After our introduction, we waded into the Moormans River with a large net. Some of the children held the net while others stirred up rocks to drive the invertebrates into the net. We then brought the net back to the beach and spread it across a picnic table. We then instructed the children to examine the net for the small insects. We displayed small posters with pictures with local aquatic bugs, worms, and larvae as a reference for what the children were searching for. When a student found an insect, we would carefully pick it from the net and place it in a water filled specimen tray. The trays contained many small water filled cups for the invertebrates to lie in. After about thirty minutes of fishing with the net

and searching for invertebrates, we used the posters to identify the insects. Students tallied the number of sensitive, somewhat sensitive, and tolerant species discovered. Point values were assigned to each species depending on their sensitivities. Sensitive species such as mayflies and hellgramittes had a value of three, somewhat sensitive species like crayfish and alderflies had a value of two, while environmentally tolerant aquatic worms and lung snails were worth one point. The total point value provided an index for the health of the stream.

The benthic macro-invertebrate testing was very exciting for the children. Not only were the students learning about how the health of the stream affects the animals who live in it, they were learning in a fun setting. The students got to wade into a stream, fish for insects big and small, and then treasure hunt through the net to discover what types of animals they had caught. The excitement the children would experience when they found an organism in the net was palpable. It was a fun learning experience for the children who were also forming an emotional bond with a local river. After the activity, they understood more not only about streams in generally, but specifically their local Mormons river. The stream testing activity was truly a joy to teach.

The Moormans River at Camp Albemarle

The third camp activity was the nature hike. We led students through a one mile trail around the camp, pointing out different plant species and signs of animal life as we walked. Prior to the start of the hike, we handed tree identification sheets to the students. We stopped at trees as we walked and had the students attempt to identify them. We told the students to focus on leaf size and appearance as well as the characteristics of the bark. The students struggled at the start, but once they understand which features to focus on, they quickly improved their skills. Ida Swenson, a naturalist for the Thomas Jefferson Soil and Water Conservation District, led the tree identification as we were not very experienced. Ida also pointed out other vegetation on the hike, including a rare species of moss. The moss had a very small environmental niche and is usually only found on the edge of waterfalls at higher altitude. However, there was a small patch at the head of the trail. About halfway along the course of the trail, a downed maple tree lay across the path. The stump of the tree looked as though it had been sharpened and the bark was stripped bare. We stopped here with the group and asked the students what they believed caused the tree to fall. We then explained that beavers had actually chewed through the tree. We described how beavers are rare in this part of Virginia, but markers like these let us know that they are still here. Towards the end of a trail, a twenty foot rock outcrop jutted out of the ground. The outcrop was in stark contrast to the green vegetation around it. Again, we asked the students what they believe caused the rock to come out of the ground there. We described how the movement of large bodies of rock beneath the ground called “tectonic plates” cause rock to slowly rise. We explained how this is the basic principle that builds mountains.

The nature hike was another fun activity that infused real environmental science knowledge. The children were able to explore and were encouraged to search the woods for signs

of animal life. The students were nature sleuths, detecting animal tracks and identifying trees. The students were fairly young, so we did not try to teach concepts like geology too in depth. But the stops along the trail did provide a basic understanding of environmental science concepts. Like in the stream testing activity, the students strengthened their bond with their local outdoors by learning about plant species and factors which affect the composition of a forest.

After all of the three stations, we introduced the kids to a game called "stream life," a tag game that also helps show the kids how pollution greatly affects an ecosystem. The goal of the game was to "cross the stream and back," essentially running across a field and back. The kids were split into 9 groups and one person that was "it". The first three groups were organisms that were highly affected by pollution. These students either had to run backwards, in circles, or bunny hop. The next three groups were organisms that were less affected by pollution and had to run in a less restricted manner, such as having one hand behind the back or holding hands with another person. The last three groups were those that were virtually unaffected by pollution and got to run as fast as they could from one side to the other without stipulations. The "it" person chose a pollutant to be (for example, fertilizer, oil, trash, etc) and ran after the other "macro-organisms." When the children were tagged, some became pollutants and others were redistributed into the tolerant to pollution groups. After each round we counted the members of each population. Once all the members of the highly affected by pollution were "killed" we graphed the data and showed that how pollution went up, biodiversity and stream health went down. The kids loved this activity and it helped them further understand what they had learned during the benthic macro-organism collection.

Schedule: We went to camp Albemarle on October 15th and again on October 21st. On October 15th we were there from 8:30-1 and on October 21st we were there from 9-1:30.

	9:00 - 9:30	9:30 - 9:45	9:45 - 10:20	10:25 - 11:00	11:05 - 11:40	11:40 - 12:20	12:25 - 1:10	1:10 - 1:30
STATIONS			Group	Group	Group			C
STREAM STUDY	A	S	#1	#3	#2		G	L D
	R	E				L	R	E E
NATURE WALK	R	T	#2	#1	#3	U	O G	A P
	I					N	U A	N A
ENVIROSCAPE & SOIL	V	U	#3	#2	#1	C	P M	U R
	E	P				H	E	P T

Budgets and Funding:

Fortunately because Camp Albemarle is an already established activity, our budget and funding is solely our gas money getting to and from the camp which we have opted to pay for out of pocket since it is a minimal cost. In the future, if we opted to expand the project we would need to secure additional funding. Possible expansion projects would include taking the project and creating a club in local elementary schools. The easiest way to fund this expansion would be through club dues, however if we went into low-income school districts it would be counterproductive to try to collect dues. Another route would be to pursue a relationship with

Madison House and create a stronger UVa partnership with the community as well as take advantage of the funding Madison House can offer. If we are unable to do this, we have also discussed the possibility of creating a club here at UVa in which we could also charge club dues to cover gas costs, train volunteers on each activity, and create a rotating schedule for volunteers to work at the Camp. We would then possibly also need funding for advertising in the form of pamphlets, posters, etc.

Documentation and Assessment:

Our metric for success, because we are an education project, is survey based. Because we operated outside and without classroom teaching aids (such as PowerPoint or the ability to pass out paper questionnaires) we had to ask general questions directed at the group as a whole. We did make a concerted effort to get answers to each question from a different child.
We questioned students before the enviroscape with the following inquiries:

1) Does anyone know which river runs through Camp Albemarle (pointing straight ahead of us and indicating the Mormons River)?
2) Can someone tell me what a watershed is?
3) Who can tell me a reason that pollution is bad for our rivers and water sources?

EnviroScape® Watershed/Nonpoint Source * Patent Number 5,427,530 * JT&A, inc. © 2010 * Size: 30" x 25" x 6"

A Sample of Student Responses to Survey Questions:

Question 1, before activity- "Does anyone know what river we are standing next to?"

Answer- "The Rivanna."

Answer, Group 4- "The Moormans."

For this question, we saw that if a student had already been through the benthic macro-invertebrate stream activity, then they knew the name of the river because it had been discussed in the activity. However, if they had not yet done that activity the answers were either the Rivanna (which is the watershed) or nothing.

Question 2, before activity- "Can anyone tell me what a watershed is?"

Answer- "A watershed is the place where all the water ends up."

When asked to elaborate, student A was unable to do so."

Answer- “Where all the water goes into the ocean.”

Question 3, before activity- “Who can tell me a reason that pollution is bad for our water sources?

Answer- “It’s bad for the fish.”

Answer- “We get the water we drink from rivers.”

We rarely got *wrong* answers, but we always had something to add to the answers given by the students. This was really an ideal situation. It showed us that students were not completely uninformed about the environment and the issues facing it, but it made clear that our presence would give them a wider and more complete understanding.

Tied in with the enviroscape activity was the soil acitivity. Before the soil activity we gave a brief explanation of making hypotheses and using the scientific method. We then asked the students to raise their hands and hypothesize about which soil box would produce the cleanest run-off water when we poured water on top. While no students responded that the thought the plain soil box would produce the cleanest runoff water, the responses were split almost 50/50 between those students who thought that the grass would produce the cleanest and those who thought the hay would produce the cleanest runoff. When we finished the activity we went back to the hypotheses and used it as a teaching moment to explain about roots and erosion to show the students *why* the grass produces clearer water than the hay.

After the enviroscape activity, we asked the same questions again and were pleased to see that all students could correctly and fully answer the questions. We made an effort to ask the questions to the kids who had answered before as well as students who had been quiet during the

activity to make sure that we were reaching the whole group and not just those most active or vocal.

In addition to all of these activities, we also helped lead the children on a nature hike with Master Naturalist Ida Swenson that wound along the Moorman's River. On this hike, we pointed out different kinds of plant life as well as a tree identification worksheet (shown at the end of this report). Most notably, on the hike, there was a tree that had been chewed by a beaver and had fallen in the middle of the path. Referencing the scientific method, we asked the children to observe this tree, come up with a hypothesis for why it had fallen, and state the evidence for this hypothesis. In this way, we were able to help the children prepare for their SOL's in a way that they could experience outside the classroom.

Finally, we introduced the children into the stream element of the program in order for them to receive an interactive education and let them apply all the knowledge they learned when they visited the enviroscape and nature hike. When the children collected the macroinvertebrates, they had to distinguish their specific species and identify if they were not, were mildly, or were strongly affected by pollution. After the collection each time, the stream received a rating of "27" on a scale of 1-30, meaning the stream was in excellent condition. We then asked the children why they felt as though this was true. Many responded with answers such as "because of the trees, there is less erosion", "there is little human pollution", "there is not a lot of fertilizer in the water" and "there is not a lot of oil in the water." We then stretched their knowledge from what they learned from the enviroscape; we asked specifically on the actions of the farm up the stream. We stated "there is a farm up the stream, do you think that they did a good job protecting

the stream? and how did they do so?" The ideal answers to this would be "yes, the farmers put up natural barriers (such as shrubbery, grasses, and trees) to protect the stream bank from erosion and put up fences to keep the cattle from soiling in the water." However, the children responded with various answers, most correct and relating to what we had in mind, but they liked to state that "the cows did not poo in the water." In this aspect, we were able to gauge how much the children learned from the enviroscape and how much information they retained throughout their rotations of the day.

We worked with a group of public school students and a group of local home-schooled students and were shocked at the difference in their knowledge levels about environmental issues. The home-schooled students seemed to come from families who placed a high importance on sustainable living. For example, one student mentioned his family's composting and another discussed his efforts into vermiculture. He and his friend raise worms and sell them to families and businesses who want to start composting. What surprised us most was that these kids not only had radical, but practical ideas as to how to reduce their pollution and carbon footprint. The home-schooled children are a prime example of how hands-on education about environmental issues truly affects the way they operate within the world.

Dissemination:

One thing we noticed through our project was the lack of trained volunteers that Camp Albemarle had to pull from before we became involved. With our involvement, it was clear that the camp ran much more smoothly and efficiently. Also evident was the impact we had (as

college-aged students) on the campers in terms of their interest and participation. We do plan to continue to be active in the camp when it opens back up again in the spring, however, we have conflicts that may interfere with our work schedule and we will not always be available.

Therefore, we hope to build an established partnership between UVA and Camp Albemarle so that students will know about the opportunity and be able to volunteer in the future. In the spring, we plan to design a flier we can put around grounds outlining the details and encouraging long-term participation for the project. We are also looking to possibly approach Madison House, so that Camp Albemarle can become one of its official, organized volunteering opportunities. Essentially, we hope UVA will become a resource for Camp Albemarle so that they will never be short of volunteers.

Appendix:

Works Cited

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Materials List

- Enviroscape
  - Two colors of Kool-Aid
  - Cocoa powder
  - plastic spoons
  - spray bottles of water
- Soil Boxes
  - soil
  - hay
  - grass
  - mason jars
  - watering can
- Nature Walk
  - Tree Identification Worksheet
- Benthic Macroinvertebrate Stream Monitoring
  - two stream nets
  - boots
  - ice trays to hold macroinvertebrates
  - spray bottles (to spray and find more animals)
  - magifying glass

Benthic Macro-Invertebrates

Sensitive

Stonefly

Gilled Snail

Mayfly

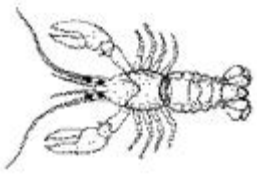
Caddisfly

Planarian

Water Penny

Hellgramite

Somewhat Sensitive

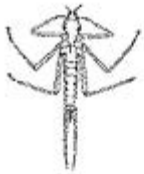


Crayfish

Alderfly

Crane Fly

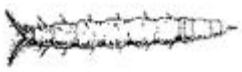
Riffle Beetle Larva



Damselfly

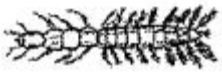
Sowbug

Dragonfly



Watersnipe Fly

Scud



Whirligig Beetle Larva

Tolerant

Aquatic Worm

Lunged Snail

Black Fly

Leech

Midge Fly

Tree I.D.

(Source: Forest Trees of Virginia, Virginia Department of Forestry)

*Beech

Leaves 3 to 4 inches long, pointed at the tip and coarsely **toothed** along the edge. Bark is distinctly smooth.

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Black Birch

Leaves **alternate**, 3 to 4 inches long. Break a twig for the distinctive smell of "root beer".

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Dogwood

Leaves **opposite**, 3 to 5 inches long, wavy along the edge. Bark broken up into small 4-sided blocks.

Red Maple

Leaves 2-5 iches long with 3 saw-toothed **lobes**. Seeds are winged and fall in a spiral motion.

Tree I.D (continued)

 * Sassafras	 Tulip Poplar (or Yellow Poplar)
Leaves can have 1, 2 or 3 **lobes** of the shapes shown above, 4 to 6 inches long	Leaves are 4 to 6 inches long, with 4 **lobes**. Tulip-shapes flowers appear in April.
 * White Oak	 * Wild Cherry (or Black Cherry)
Leaves **alternate** and 5 to 9 inches long, deeply divided into 5 to 9 rounded finger-like **lobes**.	Leaves are **alternate** and pointed with edges broken by many fine, incurved **teeth**. Bark has a bitter-almond taste.