

NATURALIST CAMPFIRE SKITS AND SONGS

Farmer Terrel: Gosh, the trees are shading the pond and fish are snapping up insects falling from tree branches.

(Use salmon oven mitt to show fish swimming under tulip tree)

Owl: Back to the time machine. Let us go back to the future to the year *(Say present year)*.

(Whooshing sound, one last disk throw and circle around tree.)

(Beech tree walks on stage between the oak and pine. kneeling with hand out straight)

Beech Tree: I am the Beech tree. I may be short now but I am growing in the shade of the tulip tree and oak. My branches are spread out to get every bit of light in the shade.



Oak Tree: *(With sad face.)* A few years ago, it was a rainy summer. Fungi invaded and killed many of my wet roots. In the last few years, it was hot and dry. With fewer roots and not enough water going up to my leaves I began to die.

Owl: It is so sad to see our mighty oak tree perish.

Beech: Farmer Terrel, when the camp cuts down the oak because it is a safety hazard, I will be able to grow faster in full sun. Dead oak branches left on the ground will rot and enrich the soil.

Farmer Terrell: My field has grown into a forest! Where there used to be meadowlarks and ground hogs in my pasture, there are now wood thrushes singing flutelike on a forest floor and flying squirrels jumping out of tree cavities!

(All actors stand together, smile, and look at the audience.)

And this is the end of this field to forest tale!

Back to the Forest Future



Ecology theme: ecological succession

Format: Movie, Back to the Future

Props: fish oven mitt, frisbee, fan, service bell, owl puppet, optional: wear lanyard signs with pictures of tree leaves or create t-shirts with leaves!

Five Actors:

1. **Farmer Terrel**
2. **Time traveler:** with puppet or stuffed animal: (In this sample skit, owl puppet)
3. **Oak Tree**
4. **Mr. Wind and tulip tree** (same actor)
5. **beech tree and pine tree** (same actor)

Opening Scene: (Farmer Terrel is standing next to oak actor center stage with arms held out vertical. Both oak and farmer remains in position throughout skit.)

Farmer Terrel: I am farmer Terrel in the year 1946. Mr. Saffran convinced me and other farmers to sell our farms to create a Scout Camp. (worried look) What will happen to this cow pasture I am standing in now?

(Off stage Owl throws frisbee to tree and actor offstage rings service bell. Owl runs to Oak Tree. Picks up frisbee and faces Farmer Terrel angled toward audience.)

Owl: Hello Farmer Terrel. I am from the future, the year (present year). I flew her on this flying saucer time machine. Gosh, it is hot here in the field. Let us get under the shade of the oak standing alone in the pasture.

Oak Tree: My branches are many feet wide since I grow in full sun. *(Oak tree pulls out tape from the tape measure between stretched out hands).* Cows used to rest in my shade. Deer still feed on acorns falling from my branches.

Owl: Farmer Terrel your field will become a forest. Let us travel to the year 1950. *(Actor offstage rings service bell. Scout with puppet holds frisbee facing forward. Circle tree once with Farmer Terrel following.)*

(Mr. Wind runs on stage facing oak. Farmer and owl face Mr. Wind.)

Mr. Wind: Hello! I am Mr. Wind. I blew in many milkweed and goldenrod seeds that float like parachutes and maple tree seeds that spin like helicopters. *(Use fan and make wind sounds.)*

For the last few years, birds have also been flying over the pasture after eating blackberries and wine berries. They then regurgitate or poop out the seeds over the pasture. The pasture is no longer. It has now become thick with many thorny blackberry and wineberry bushes.

Mr. Oak, your acorns are also sprouting into sapling oak trees.

Owl: Let us time travel to the bicentennial year 1976.

(Pine tree walks on stage and stands next to oak with arms held down: see illustration)



Pine tree: Hello time travelers. I am a Virginia Pine tree. We are a pioneer tree now growing alongside the sticker bushes. We can withstand the hot and cold of the field because we have waxy-like coated pine needles to conserve water. My older branches near the ground have grown out to gather sunlight.

(Tulip tree walks on stage holding arms in u-shape towering over pine tree.)



Tulip Tree: Not so fast piney! I am a Tulip Poplar tree. I am taller than you. I grow straight and fast towards the sky. However, my lower branches do not tolerate the shade. My surviving branches are now at the top in the

Pine tree: I do not like your shade Tulip tree. We, the pine trees are dying, falling to the ground, rotting, and enriching the soil.

(Pine tree will now fall to ground and make Aaahh!! sound then walk off stage and throws the fish oven mitt to farmer Terrel.)



Bird in Hand Story

Once upon a time, there lived, high in the mountains, an old man known for his wisdom.

He often ventured down into the local village and amazed many people with his knowledge and insight.

He knew when it would rain, and thus when the village should plant crops. He could predict the frost, and thus when crops should be harvested. He knew how to treat illness and prevent impending sickness. Being so well respected, people would flock to him to seek his wise advice and counsel. They would bring questions and the wise man always knew the correct answer.

One day a troublesome young lad, using a baby bird he found in the woods, devised a plan to trick the old man into a wrong answer. He looked at his buddy and spoke. "I have a plan to fool the old man. I will ask him, 'What's in my hand?' If the old man says, 'A bird.' I will ask, 'Yes old man, but tell me, is it alive or is it dead?'" If he says, 'dead,' I will open my hands and let the bird fly away. If the old man says, 'alive,' ... I will crush it in my hands and let it fall to ground dead. The boys laughed at the plan. They would make a fool of him in front of everyone!

The following day, the wise old man came down from the mountain into the village and was talking to a crowd of villagers. At that moment, the boy, alongside his buddy, walked up to the crowd with the bird hidden in his hands. He then looked at the old man with a mischievous grin and asked, "Old man, what is it that I have in my hands?"

The wise old man thought for a moment and then said, "You have a bird, my son."

The boy then said, "Yes, old man, you are correct, but tell me: Is the bird alive or is it dead?"

The wise old man thought and then looked very sad as he looked at the boys and slowly replied....."That, my son, ...depends... on...you."

This story relates to how the future of the Earth and all its inhabitants depend on what we do. Our actions, if positive, will enable the Earth and all its inhabitants to flourish. If we are careless, we will leave things worse for future generations.

The Bear Song, (Echo repeat each line)

The other day, I met a bear,
Up in the woods, A way up there.
He looked at me, I looked at him.
He sized up me, I sized up him.
He said to me, Why don't you run?
I see you don't, Have any gun.
And so I ran, Away from there,
And right behind, Me was that bear.
Ahead of me, I saw a tree,
A great big tree, Oh, golly gee.
The lowest branch, Was ten feet up,
I had to jump, And trust my luck.
And so I jumped, Into the air,
But I missed that branch, On the way up there.
Now don't you fret, And don't you frown,
I caught that branch, On the way back down.
That's all there is, there ain't no more,
Until I meet that bear once more.

All God's Critters Got a Place in the Choir

Bill Staines

Chorus: All God's critters got a place in the choir
Some sing low, some sing higher
Some sing out loud on the telephone wire
Some just clap their hands, or paws,
or anything they got now.

1. Listen to the base, it's the one on the bottom
where the bullfrog croaks and the hippopotamus
moans and groans with a big t'do,
and the old cow just goes MMMOOOOOOOOO!

Chorus

2. The dogs and the cats they take up the middle,
where the honeybee hums and the cricket fiddles
The donkey brays and the pony neighs
and the old coyote HOOOOOWWWLLLSS

Chorus

3. Listen to the top where the little birds sing
on the melodies with the high notes ringing.
The hoot owl hoots over everything.
And the jay bird DISAGREES.

Chorus

4. Singing in the nighttime, singing in the day,
the little duck quacks, then he's on his way,
the possum ain't got much to say,
and the porcupine talk to himself.

Chorus

5. It's a simple song of living sung everywhere
by the ox and fox and the grizzly bear,
the grumpy alligator and the hawk above,
the sly raccoon and the turtle dove

Chorus

Chipmunk "Witchdoctor" Song

Song sequence:

Leader: My friend the (redwood tree), she told me what to say!

Group: boom boom boom boom

Leader: My friend the (redwood tree), she told me what to do!

Group: boom boom boom boom

Leader: (She said, "We once were many and now we're just a few!") and we sang.....



Chorus:

00 ee oo ahh ahh ting tang walla walla bing bang

00 ee oo ahh ahh ting tang walla walla bing bang

Verses:

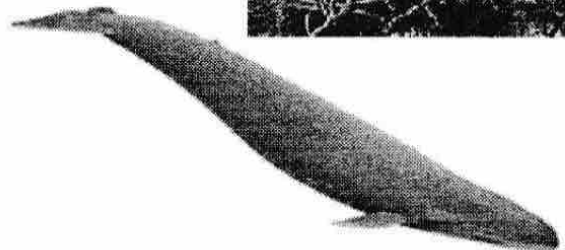
Bald Eagle

She said, "Your pesticides are killing me and my little eaglets too!"



Great Blue Whale

He said, "When we are, gone it's you who will be blue!"



Grizzly Bear

She said, "How would you like it if they tried to stuff you!"



Garter Snake

He said, "We're munching mice so they won't munch your food!"



garter snake

Nosebag Drama for a Nature Themed Campfire

1. Place in bags safe household objects to be used as a prop in a skit. One object for each skit actor.
2. For example, a spatula, kitchen timer that goes bing, funny hat, basket, empty coke bottle, etc. Be creative.
3. It can be used as a spatula in the skit or a use can be invented based on the story.
4. I also like to put a stuffed animal or puppet in the bag.
5. Scouts create an environmental skit with the topics and format as shown here. Circle one used:

Nature Study	Action to protect the environment	
Ecology	Introduced animals	Invasive plants
Recycling	Habitat Loss	Climate Change
Pollution	Overpopulation	Alternative Energy
Endangered Animals	Nature Study	Plastics in the ocean



6. Here are some creative themes for the skits:
Circle one used:

Television commercial	Superhero	Reality TV
Game Show	Interview Show	Broadway Play
H G TV	Sporting Event	Fairy Tale
Informercial	Melodrama	Situation Comedy TV Show
Your Idea?		

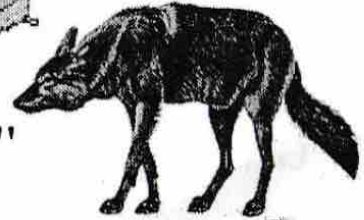
Wood Slug

He said, "We're sliming leaves to help the soil renew!"



Coyote

She said, "Coyotes belong on earth like you!"



Great Horned Owl

He said, "If you are quiet, I will hoot for you!"



Bicycle

She said, "If you ride me the skies they will stay blue!"



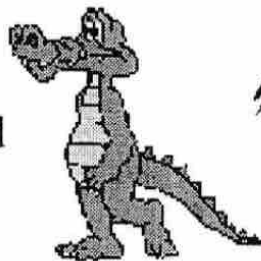
California Condor

He said, "It gets kind of lonely up here when there's only 25 left of you!"



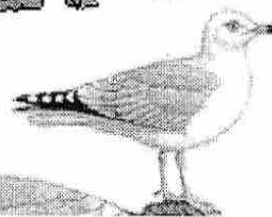
Alligator

She said, "I don't want to end up as your shoe!"



Herring Gull

He said, "The next oil spill will turn my feathers to goo!"



Breakdancer

She said, "I like to pop and study nature too!"



The Naturalist

He said, "Caring and sharing is part of learning about nature too!"

Mother Earth

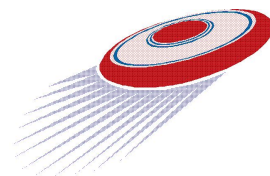
She said, "If you take care of me, I'll take care of you!"



NATURALIST GAMES



Post Nature Hike Frisbee Golf Competition



Name: _____ Unit #: _____

Scorer: _____ First Hole: 1 2 3 4 5 6 7 8 9 10

Hole	Circle Answer	Throws	Nature Long Answer
1	A B C D E		
2	A B C D E		
3	A B C D E		
4	A B C D E		
5	A B C D E		
6	A B C D E		
7	A B C D E		
8	A B C D E		
9	A B C D E		
10	A B C D E		

TOTAL NUMBER OF THROWS: _____

For courses with just multiple choice questions:

Number correct: _____ out of 10

For courses with both multiple choice and long answer questions:

Number correct: _____ out of 20

1. What is false about the Tulip Poplar Tree?

- A. It is not very shade tolerant.
- B. Native Americans made dugout canoes from the tree.
- C. Tulip tree flowers are orange.
- D. Tulip tree flowers are blue and white colored.
- E. Honeybees like the flowers.



Question: What kind of bird builds basket-like nests in tulip trees?

2. What kind of trees did the British prefer to use for ship's masts?

- A. White Oak
- B. Virginia Pine
- C. Eastern White Pine
- D. Black Walnut
- E. Tulip Tree



Question: How many needles are in each bundle?



3. What is false about the White-tailed Deer?

- A. Deer consume many acorns preventing oak regeneration.
- B. Deer are most active at dawn and dusk.
- C. Deer are considerate and only eat thorny plants and leave behind native wildflowers.
- D. Mountain lions and wolves no longer control deer populations in Maryland.
- E. Bucks rub their antlers on trees.

Question: Deer are herbivores because they eat _____?

4. How many gallons of sap need to be boiled down to make a gallon of Red Maple syrup?

- A. 5 B. 10 C. 25 D. 50 E. 70

Question: How many gallons of sap need to be boiled to make a gallon of Sugar Maple syrup?



5. What is false about the Beech tree?

- A. It has a triangular fruit or nut.
- B. Its wood is made into very expensive furniture.
- C. Tree branches spread out to gather light in shady areas.
- D. Wood is used to make tool handles.
- E. The nuts or fruit are eaten by birds.

Question: What kind of tree is now growing above the Beech tree?

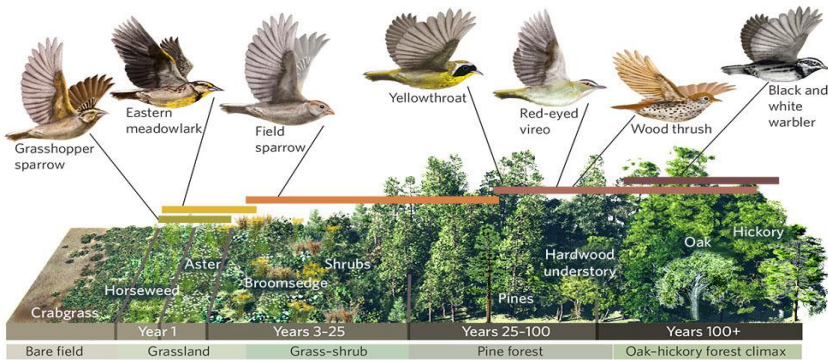


6. What is false about the Eastern Red Cedar?

- A. Cedar waxwings feed on its berries.
- B. Used to make mothproof chests
- C. It is a pioneer tree, the first to grow in fields.
- D. It will grow well in very shady areas.
- E. Its wood is rot resistant and smells nice!



Question: What color do you find at the end of a Cedar Waxwing's tail? The color has been removed from the illustration of the bird here!



7. What word describes how plants and animal communities change over time as illustrated above?

- A. area matriculation
- B. ecological succession
- C. species meandering
- D. land graduation
- E. plant and animal slippage

What happened to Broad Creek's Lake in 1972?

8. What is not true about the Pileated Woodpecker? (Look at bird in guide or video!)

- A. They create nest holes for other animals.
- B. They have long tongues with sticky barbed ends.
- C. They have red capped heads.
- D. They like to eat ants.
- E. Instead of a tongue, they have a vacuum tube.

What hoofed animals grazed along Broad Creek before the dam was built to form Lake Strauss?

9. What species of tree do Scarlet Tanagers prefer for nesting?

- A. American Beech
- B. Red Oak
- C. Tulip Poplar
- D. White Oak
- E. Red Maple



What is the second favorite tree for Scarlet Tanager nesting? (Look at chart in book or video!)

10: What is not true about dragonflies and damselflies?

- A. Vicious mosquitoes eat them.
- B. Both eat many mosquitoes.
- C. Damselflies hold their wings together.
- D. Young are called nymphs.
- E. Nymphs emerge from the water as adults.



Question: What kind of eyes do they have?

C_____ Eyes



Post Nature Hike Frisbee Golf Competition



Leader key to quickly check answers.

Name: _____ Unit #: _____
Scorer: _____ First Hole: 1 2 3 4 5 6 7 8 9 10

Hole	Circle Answer	Throws	Nature Long Answer
1	A B C (D) E		Baltimore Oriole
2	A B (C) D E		Five
3	A B (C) D E		Plants
4	A B C D (E)		Thirty-five
5	A (B) C D E		Red Maple
6	A B C (D) E		Yellow
7	A (B) C D E		Flood Agnes, mud in lake.
8	A B C D (E)		cows
9	A B C (D) E		Chestnut Oak
10	(A) B C D E		Compound

Avoid traffic jam! Start each team or individual Scout at a different hole! Circle first hole on each answer sheet given. Scouts can take turns throwing frisbees.

Encourage Scouts to pay close attention during your nature hike to know the correct answers for the frisbee game after the hike. Open book: they can reference video on phone or nature guide for answers.

If you don't have hula hoops for the holes, you can have the Scouts hit the box for a hole.

TOTAL NUMBER OF THROWS: _____

For courses with just multiple choice questions:

Number correct: _____ out of 10

For courses with both multiple choice and long answer questions:

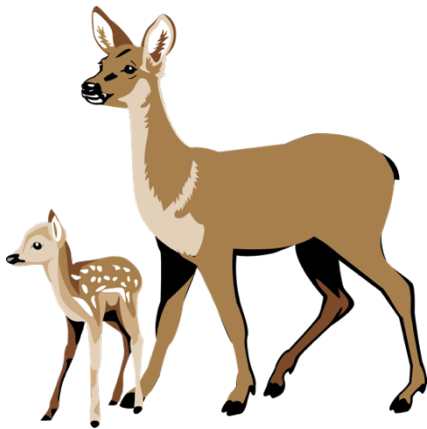
Number correct: _____ out of 20



Old deer: Skip, one leg forward all the time!



Insane deer: run backwards!



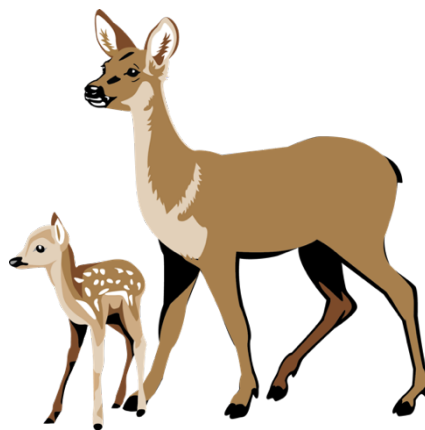
Mother and fawn: both hold rope



Blind Deer: wear blindfold



Injured deer: hop on one leg



Mother and fawn: both hold rope



Healthy deer: run fast!



Healthy deer: run fast!



Healthy deer: run fast!



Healthy deer: run fast!



Healthy deer: run fast!



Healthy deer: run fast!

Mountain Lion and Deer Game Running Game

Learn about effects of
removal of predators in this
active field game



Materials: clothes pins (one for each scout), objects to mark playing area, cloth pieces for deer roles, short piece of rope knotted on both ends, noise maker

Procedure:

1. Sit scouts in a circle. Ask them, "In a natural area, how are deer populations controlled?" Possible answers: hunting, predators, cars, etc.

2. Introduce purpose. Tell scouts they will, as a group, simulate a deer population being preyed upon by one or two mountain lions.

3. Introduce game:

Say: "Are all deer in a population healthy and challenging for the lion to hunt?" (No!)

Say: "What could make it easier for the lion to hunt the deer?"
(Possible answers: deer are injured, diseased, old, young, blind)

Say: "We are going to play a game in which each of you will take the role of either prey (deer) or predator (lion).

4. Review rules of the game:

A. The object of the game, if you are a deer, is to avoid having your life taken away by the lion.

B. If you are a lion, you must try to get as many deer lives by pulling a clothespinned-deer-role-cloth off each "deer."

C. You will be given about one minute to play the game.

D. All deer must stay within the boundary lines of the game area.

If you stray outside, it is like falling off a cliff; you are dead!

E. Once deer have had their lives removed, they must gather to a area designated by the leader and watch the rest of the game.

F. There is one stipulation! Not all of the deer will be healthy!

5. Assign each scout a role. Keep a ratio of about one healthy deer to every three non-healthy deer. Attach with a clothespin a cloth labeling a role to the back of each scout's shirt.

<u>Role cloth</u>	<u>Behavior scouts must follow</u>
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injured deer	hop on one leg
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young deer and mother	two scouts hold onto either ends of rope to show dependency
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insane deer	run backwards
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blind deer	blind-folded
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old deer	you can only skip to show limited running range
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healthy	run fast!
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Mountain Lion	run fast!
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(Try to avoid assigning the mountain lion roles to the fastest-running scouts.)

6. Play game: Have scouts spread throughout game area. Area size depends on size of group. They must wait until you signal with whistle or other noise making item. Signal start of game. When most of the deer have had their lives removed, signal end of game with noisemaker.

- 7. Discuss game:** Have scouts form a circle on ground after playing game. Ask scouts the following questions:
- What deer were killed first? Why? Have mountain lions show deer role cloths.
 - What was the condition of the deer remaining?
 - How does it help the deer population if the weak and injured deer are preyed upon more easily?
 - What do you think would happen to the deer population if there were no mountain lions?

E. What are some problems in Maryland with too many deer?

1. Farmers crops and home garden plants are eaten
2. Native forest plants are eliminated or their numbers are greatly reduced.
3. Invasive plants and introduced as well as native plants deer don't like increase in numbers.
4. Lyme disease
5. Car accidents
6. The oak forest cannot regenerate because the deer eat most of the acorns.
7. Browse line: Most of the leaves and even branches eaten up to 5 feet.
8. Birds that nest in the lower trees cannot hide their nest since saplings are few.

F. What are solutions?

1. Re-introduce predators like they did in Yellowstone?
2. Managed hunting or market hunting?
3. Deer fencing in yards up to entire parks
4. Plant a variety of native trees, especially oaks in grow tubes
5. Deer repellents
6. Deer contraceptives

Game variation:

1. Use poker chips or any other objects to simulate food.
i.e. Tell deer to only grab green poker chips and leave others behind
2. When you review game, tell Scouts that the green chips represent native plants and the red chips represent non-native plants
3. Play game in the same time period with no predators with deer having roles
4. Play game in the same time period with all deer healthy!

Excerpt from
National
Geographic
Magazine

Before & After Wolves

Restoring wolves to Yellowstone after a 70-year absence as a top predator—especially of elk—set off a cascade of changes that is restoring the park's habitat as well.

YELLOWSTONE WITHOUT WOLVES 1926-1995

ELK overbrowsed the stream side willows, cottonwoods, and shrubs that prevent erosion. Birds lost nesting space. Habitat for fish and other aquatic species declined as waters became broader and shallower and, without shade from streamside vegetation, warmer.

ASPEN trees in Yellowstone's northern valleys, where elk winter, were seldom able to reach full height. Elk ate nearly all the new sprouts.

COYOTE numbers climbed. Though they often kill elk calves, they prey mainly on small mammals like ground squirrels and voles, reducing the food available for foxes, badgers, and raptors.

ART BY FERNANDO G. BAPTISTA, NO STAFF;
AMANDA HOBBIE, NO STAFF
SOURCES: ROBERT L. BECHTOLD AND
WILLIAM J. RIPPKE, OREGON STATE
UNIVERSITY; DOUGLAS W. SMITH,
YELLOWSTONE NATIONAL PARK



YELLOWSTONE WITH WOLVES 1995-PRESENT

ELK population has been halved. Severe winters early in the reintroduction and drought contributed to the decline. A healthy fear of wolves also keeps elk from lingering at streamside, where it can be harder to escape attack.

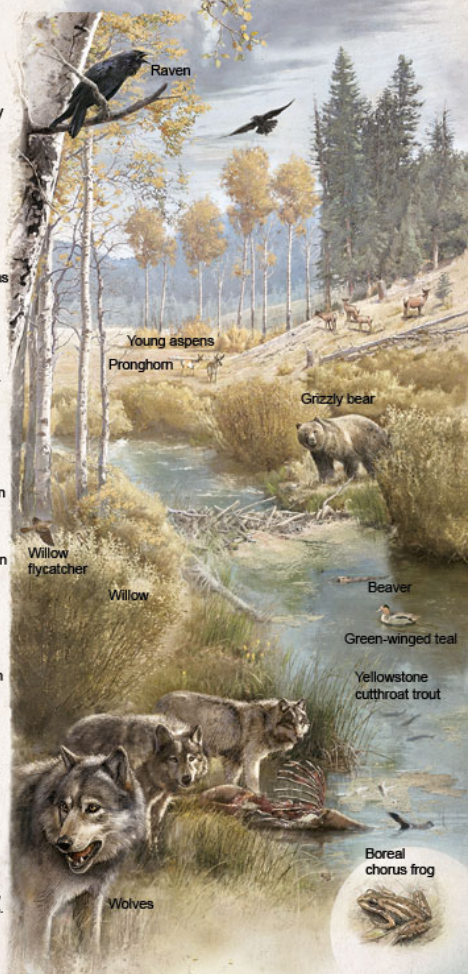
ASPENS The number of new sprouts eaten by elk has dropped dramatically. New groves in some areas now reach 10 to 15 feet tall.

COYOTES Wolf predation has reduced their numbers. Fewer coyote attacks may be a factor in the resurgence of the park's pronghorn.

WILLOWS, cottonwoods, and other riparian vegetation have begun to stabilize stream banks, helping restore natural water flow. Overhanging branches again shade the water and welcome birds.

BEAVER colonies in north Yellowstone have risen from one to 12, now that some stream banks are lush with vegetation, especially willows (a key beaver food). Beaver dams create ponds and marshes, supporting fish, amphibians, birds, small mammals, and a rich insect population to feed them.

CARRION Wolves don't cover their kill, so they've boosted the food supply for scavengers, notably bald and golden eagles, coyotes, ravens, magpies, and bears.



OTHER NATURALIST RESOURCES

Seton Scout Naturalist Program Materials, Baltimore Area Council, BSA

Marty Brazeau has all these items that can be borrowed that was purchased with Scout Naturalist funds. Contact him at scoutnaturalist@gmail.com. He can bring them to camp if you recruit him to help with your program. Or, you can purchase the items for your Scout unit, especially if you plan on presenting a nature weekend every year.				
Item and Use	Image	Source	Quantity	Cost
40-Gallon Black Tote with Latching Lid To store nature weekend materials.	Nature Program Materials container 	Lowes or other store	1	Varies
Small LaMotte Student Grade Kick Net, Poles need to be purchased separately, (needed for collecting organisms in stream riffles) or similar smaller kick seine for stream studies.		Amazon or search the internet. You could make your own with fiberglass netting and dowels. There are many instructions searching google. Here is one:https://thedragonflywoman.com/2016/11/06/making-a-kick-net-by-hand/	1-3 depending on Scout Unit size.	42.5



Stream Macroinvertebrates

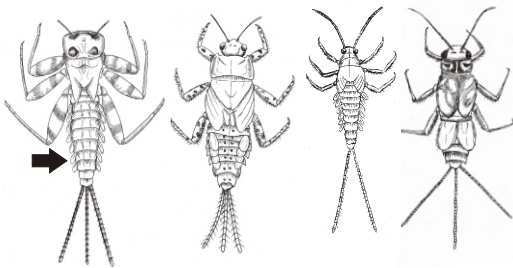
Maryland Department of Natural Resources



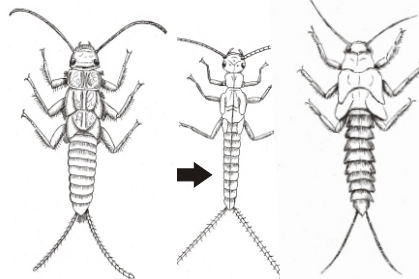
Relative abundances in Maryland are indicated by “rare”, “common”, or “abundant”. The number of families in Maryland for higher taxonomic levels are also listed (if applicable). Sizes are for “full grown” animals. To learn more about these fascinating creatures, go to <http://www.dnr2.maryland.gov/streams/Pages/streamLife.aspx>. To learn about DNR’s volunteer stream monitoring program, Maryland Stream Waders, send an inquiry to streamwaders.dnr@maryland.gov.

SENSITIVE ORGANISMS

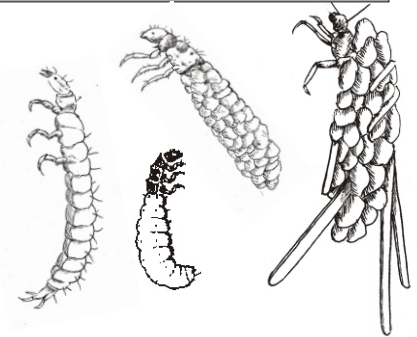
POLLUTION-SENSITIVE ORGANISMS TYPICALLY FOUND IN HEALTHY STREAMS



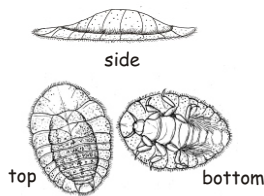
Mayfly: Order Ephemeroptera- Plate-like or feathery gills on sides of lower body (arrow); three (sometimes 2) long, hair-like tails; 1”; abundant; 11 families.



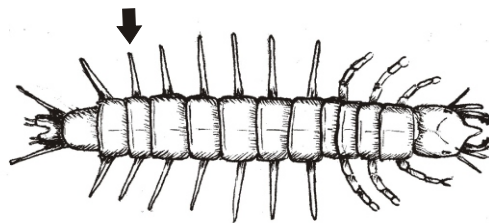
Stonefly: Order Plecoptera-Two hair-like tails; six jointed legs with two hooked tips each; big antennae; no gills on lower half of body (arrow); 1½”; abundant; 9 families.



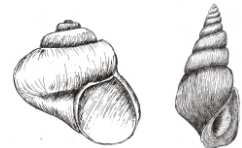
Caddisfly: Order Trichoptera- Six jointed, hooked legs just behind head; 2 hooks at back end; may be in a case made of stones, leaves or sticks; non-netspinning caddisflies have no bushy gills along bottom; 1”; abundant; 20 families.



Water Penny: Order Coleoptera- shaped like a tiny, grey, oblong frisbee; 6 tiny legs on bottom; slow crawler; ½”; common.



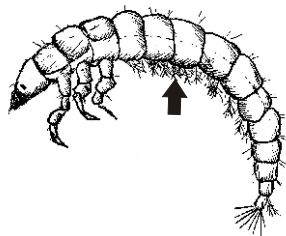
Hellgrammite and Fishfly: Order Megaloptera- dark body; six jointed legs; large, pinching jaws; many pointed feelers along edge of body (arrow); two small hooks at back end; hellgrammites have feathery tufts of gills along side of body; 4”; rare.



Gilled Snail: Class Gastropoda- shell opens on the right and is covered by a hard shield-like operculum; 1”; rare; 4 families.

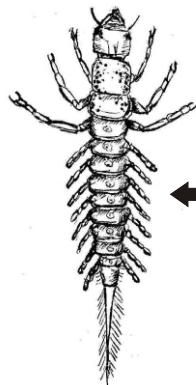
MODERATELY-SENSITIVE ORGANISMS

MODERATELY POLLUTION-SENSITIVE ORGANISMS FOUND IN HEALTHY OR FAIR QUALITY STREAMS



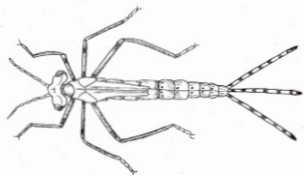
Net-spinning Caddisfly: Order Trichoptera- six jointed, hooked legs just behind head; 2 hooks at back end; bushy gills along lower half (arrow); 1”; abundant.

Alderfly: Order Megaloptera- six jointed legs; pinching jaws; many pointed feelers along edge of body (arrow); long tail at the end; 1”; rare.

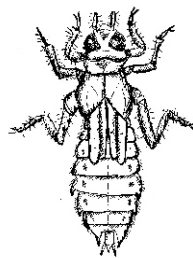
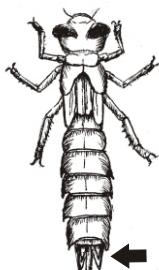


Crane Fly: Order Diptera- worm-like; no jointed legs; head hidden inside the light brown body; 4 finger-like lobes at back end (arrow); 2”; abundant.

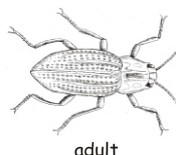
MODERATELY-SENSITIVE ORGANISMS (continued)



Damselfly: Order Odonata- 6 long, thin legs; 3 broad oval tails at end (arrow); may have wing pads; no gills along sides of body; 2"; common; 3 families.



Dragonfly: Order Odonata- large eyes; bullet-shaped, round or leaf-like body; 6 long legs; 3 short-spike-like tails (arrow); may have wing pads; 2"; common; 6 families.

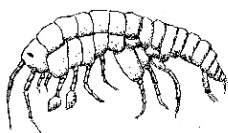


adult



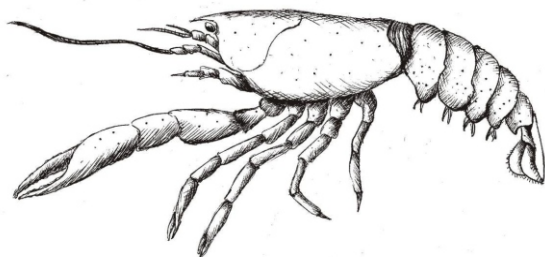
Larva

Riffle Beetle: Order Coleoptera- 6 jointed legs; brown or black; adults have hard covering over the wings, body with fairly hard covering; 3/8"; abundant.

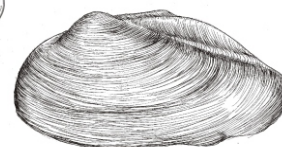


Scud: Order Amphipoda- white to gray; more than six legs; swims on its side; looks like a small shrimp; 1/4"; abundant; 3 families.

Crayfish: Order Decapoda- 8 walking legs and 2 pinching claws; 6"; abundant.



Clams and mussels: Class Bivalvia- two hinged hard shells; 5"; rare; 2 families.



TOLERANT ORGANISMS

POLLUTION-TOLERANT ORGANISMS FOUND IN HEALTHY, FAIR OR POOR QUALITY STREAMS



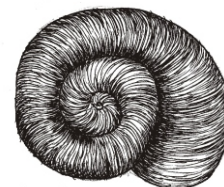
Black Fly: Order Diptera- shaped like a little bowling pin; black head with tiny bristles for filtering food (arrow); suction pad on end; no jointed legs; 1/2"; abundant.



Non-biting Midge: Order Diptera- dark head; body white, gray or reddish; worm-like segmented body; 2 tiny unjointed legs on both ends (arrow); 1/2"; abundant.



Leech: Order Hirudinea- brown or grey, slimy, suction pads on both ends (arrow); 2"; rare; 3 families.



Ramshorn Snails: Class Gastropoda- No hard cover over opening; shell coiled in one plane; 1/2"; common.



Aquatic worm: Class Oligochaeta- thin and hairlike or thicker like an earthworm; 2 1/2"; common; 8 families.



Pouch Snail: Class Gastropoda- shell opens on the left; no hard covering over shell opening; 3/4"; common.



Seton Scout Naturalist Program Materials, Baltimore Area Council, BSA

Madison Mill Round Wood Poplar Dowel: Poles for Seine net : 4.18 each x 8. (Actual: 48-in L x 1-in dia). Two dowels needed for each kick seine.		Lowes Item: #19386. Model: #436513.	2	8.36
Optional: LaMotte 0168 D-Net with Expandable Pole (use for collecting organisms in stream pools) or similar net. This one is high quality and expensive, so if you plan on repeating the weekend every year, good to		Amazon Model #: 1186Y32EA	1	varies
White dish tub. Use to collect and examine stream organisms.		Amazon or Home Depot, Dollar Store	1	varies
Plastic Organizer Container Box with Dividers - 36 Compartment Organizer, Stream Study: Used to separate and count species of organisms collected.		Amazon or cheaply at fabric story (used to store thread spools)	1 or 2	varies

Seton Scout Naturalist Program Materials, Baltimore Area Council, BSA

Optional: uxcell Black Plastic Slant Flat Tip Anti-static Tweezers for picking up stream critters. 4.7 Inch Length 3pcs,, Optional, student can use fingers if careful.		Amazon	2 pieces in one pack	5.88
Edu-Toys Two Way Bug Viewer , 4x, 6x by Elenco,	Stream Study: Use examine organisms up close. 	Amazon Order 2 viewers at \$9.99 each Well-ventilated Bug Viewer to collect and view bugs. 2 people can view at the same time Top magnification 6x, side magnification 4x	2	19.98
Hula hoops: Ten hoops (optional to serve as fun target for frisbee golf. Can be borrowed from local school gym teacher.	Nature Trail: Target for frisbee golf game. Scouts throw frisbee into hoop.	Dollar Store	10	10
Dollar store plastic bins , ten \$1 bins. Nature Trail: Used to mark each hole. Each box contains a question. The bins can also be used as boundary markers for field games.		Dollar Store	10 bins	10

Seton Scout Naturalist Program Materials, Baltimore Area Council, BSA

You can print out Frisbee golf questions to place on dollar store boxes upside down to create the ten holes for the frisbee golf game played after visiting the nature trail. Scouts can hit the box to complete a hole. Or put a frisbee at next to each box as a hole. Good idea to laminate the questions so the box can be reused and to make each printed question rainproof.		Print out questions	10 boxes needed	1.25 each?
Frisbees, 10 in., 10 at \$1 each. or Scouts can bring their own!	Nature Trail: flying disks for disk golf game that reviews information from trail 	Dollar Store	10	10
Your Scout unit can buy an inexpensive laminator and film on Amazon from 3M to laminate stream study materials and other naturalist material that needs to be protected. Items to be supplied by troop: Wintergreen lifesavers for night hike, small table for stream study or drop cloth, clothes pins for mountain lion game, magic markers for solo, field guides. Recommended National Audubon Society Field Guide to the Mid-Atlantic States iPad: The Nature Trail guide is available on PowerPoint. Video of owl and frog calls can be shown from iPad. Stream study guide to organisms is online:https://www.macroinvertebrates.org/ Nosebag Campfire Skit: The troop will bring a bag containing 5 or six safe to handle household items to be used as props for each patrol's nature-themed campfire skit. Each bag can also contain a stuffed animal or puppet.				

Seton Scout Naturalist Program Materials, Baltimore Area Council, BSA

Items to be supplied by each Scout: bandana to use as a blindfold, clipboard or writing surface, pen or pencil, drawing supplies, to be used during solo day pack, insect repellent, hiking boots, rain gear, frisbee for golf after nature trail.

Optional: binoculars. Marty Brazeau can purchase Vortex binoculars half price for your unit nature equipment box. Contact Marty at scoutnaturalist@gmail.com

Recording Form for the Citizen Monitoring Biotic Index

Name: _____ Date: _____

Watershed and Stream Names: _____ Time: _____

Location: _____ Site ID: _____
(County, Township, Range, Section, Road, Intersection, Other)

At this point, you should have collected a wide variety of aquatic macroinvertebrates from your three sites. You will now categorize your sample, using the chart (other side) to help you identify the macroinvertebrates found. The number of animals found is not important; rather, the variety of species and how they are categorized tells us the biotic index score. Before you begin, check off the sites from which you collected your sample (see right).

- ☐ Riffle Sampling
- ☐ Snag Areas, Tree Roots, Submerged Logs
- ☐ Leaf Packs
- ☐ Undercut Banks

1. Check the basin with the debris to see if any aquatic macroinvertebrates crawled out. Add these animals to your prepared sample.
2. Fill the ice cube tray half-full with water.
3. Using plastic spoons or tweezers, (be careful not to kill the critters -- ideally, you want to put them back in their habitat after you're finished) sort out the macroinvertebrates and place same species together in their own ice cube tray compartments. Sorting and placing same species together will help insure that you find all varieties of species in the sample.
4. Refer to the "Life in the River Key" and the Citizen Monitoring Biotic Index to identify the macroinvertebrates:
 - A. On the back of this page, circle the animals on the index that match those found in your sample.
 - B. Count the number of circled animals in each category and write that number in the box provided.
 - C. Enter each boxed number in work area below.
 - D. Multiply the entered number from each category by the category value.
 - E. Do this for all categories.
 - F. Total the number of animals circled.
 - G. Total the values for each category.
 - H. Divide the total values by the total number of animals: total values (b) / total animals (a).
 - I. Record this number.

SHOW ALL MATH (Use space below to do your math computations)

No. of animals from group 1 _____ x 4= _____

Return form to:

No. of animals from group 2 _____ x 3= _____

No. of animals from group 3 _____ x 2= _____

No. of animals from group 4 _____ x 1= _____

TOTAL ANIMALS(a) _____ TOTAL VALUE(b) _____

Divide totaled value (b) _____ by total no. of animals (a) _____ for index score:

Call your local Monitoring Coordinator if you have questions about sampling or determining the Biotic Index Score.

Index score:

How Healthy is the Stream?

Excellent-----3.6+
Good-----2.6 - 3.5
Fair-----2.1 - 2.5
Poor-----1.0 - 2.0

Seton Scout Naturalist Stream Study

Equipment Checklist for a Successful Stream Study



___ kick seine(s) with 2 wooden dowels



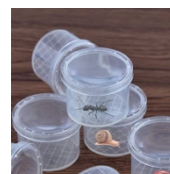
___ La Motte dip net



___ 3 ice cube trays or plastic organizer boxes from fabric store



___ plastic magnifier bug boxes for organism transport and examination



___ laundry tub for housing organisms before classification



___ Edu-Toys Two Way Bug Viewer



___ tweezers for lifting organisms



___ ping pong ball

___ organism identification guides

___ recording form for the Citizen Monitoring Biotic Index

___ white or colored plastic ground cloth to keep everything clean and away from dirt

___ Broad Creek Topo map for watershed examination

___ Clipboard and pen for filling out recording biotic index

___ Optional: Stream and insect field guides

___ A. **Introduction:** Review purpose of the stream study:

1. Have fun and learn about stream ecology and organisms.
2. Determine the health of the stream by counting the number of organisms and examining the diversity of micro-habitats of the stream.

___ B. **Watershed on topographic map:** Examine watershed of the stream you are sampling.

1. Operationally define the term watershed by tracing a stream to a larger body of water.
2. Ask: Why is a watershed like a tree? (branches like streams, trunk like rivers)
3. If many trees were cut down in this stream's watershed, how might it affect the stream organisms and the Bay?
4. Examine **Riparian Vegetation Condition Diagram**. Elicit how shaded streams are result in a healthier Chesapeake Bay and more trout that like cold and well oxygenated water!

___ C. **Microhabitats of the stream:** Optional based on time allotted for stream study, this could also be demonstrated by a leader as Scouts are collecting organisms.

1. With participants on the bank, carefully walk in stream.
2. Show micro-habitats that will determine the organisms found in the stream using a ping pong ball.

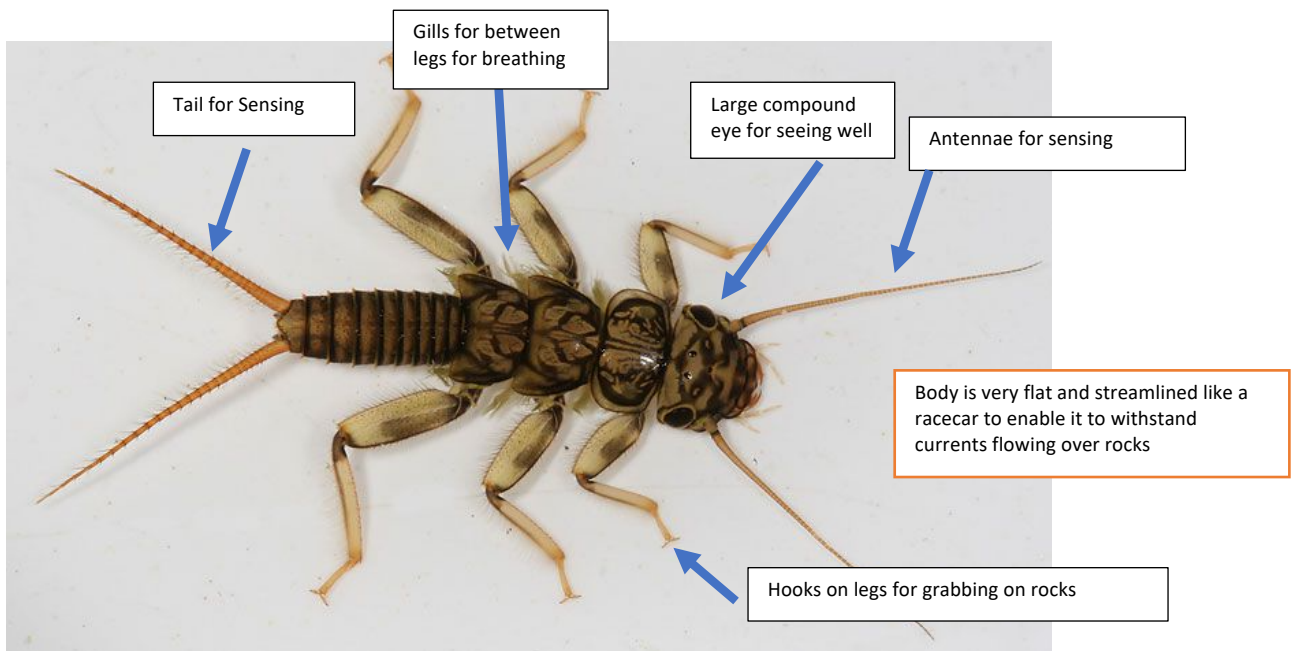
	 ball reaction	Water movement	Substrate
Riffle	ball spins in hydraulic and moves upstream at eddy	fast current around many obstacles	pebbles to large rocks
Raceway	ball moves quickly downstream	moves quickly one direction	rock, debris
Pool	ball relatively still	slowly downstream	sediment

___ D. **Collection of macroinvertebrates:** Scouts will be chomping at the bit to get their feet wet and collect organisms. Demonstrate stream etiquette and collection methods.

1. Those without nets can lift rocks carefully and remove organisms off with tweezers and to be placed into bug boxes. No throwing rocks permitted, or you will be sitting out the stream study. Leaves and sticks in streams may also have critters.
2. **Demonstrate:** Kick seine or La Motte dip net: dislodge rocks upstream from net. Make sure net is on the stream bottom. Organisms will flow into net.
3. Organisms can be placed into the laundry tub. Duplicate organisms can be placed back in stream. We are interested in counting species of organisms, not number of each species!
4. Scouts can begin the process of separating macroinvertebrates into the ice cube trays or organizer boxes and begin identifying each species with stream organism guides.

___ E. **Identify Organisms**

1. Using keys, identify organisms and finish separating them the trays or organizer boxes.
2. Examine how organisms are adapted to the stream environment.
3. Show how most macroinvertebrates are nymphs or larvae of adult insects. Show illustrations showing both nymphs and adults.
4. Most of the egg laying is done by winged adults depositing eggs in streams.



___ F. **Biotic Key**

Fill out the biotic key

Return all materials like you found them in the Broad Creek Seton Scout Equipment box

G

Conclusion: (five minutes) Have participants discuss the following questions: Why is the stream we just sampled so healthy? What can ruin a stream in your own community? What can you do to ensure streams are healthy?

Thermal Pollution

Causes and Effects: no shade trees: fish can't live in high temps
Solution: plant trees, let vegetation grow

Trash

Causes and Effects: dumping: blocks passages, ugly, mosquitoes
Solution: recycle and pick up garbage

Eutrophication

Causes and Effects: over-fertilization: removes oxygen, kills life
Solution: compost pile, organic gardening

Sediment

Causes and Effects: construction, farming: smothers habitat
Solution: strict sediment control legislation

Toxins

Causes and Effects: pesticides, motor oil, paint: kills fish life
Solution: organic substitutes, oil recycling, drain labeling

Acid Rain

Causes and Effects: car and power plant emissions: barren lakes
Solution: ride bikes, conserve electricity

Water Depletion

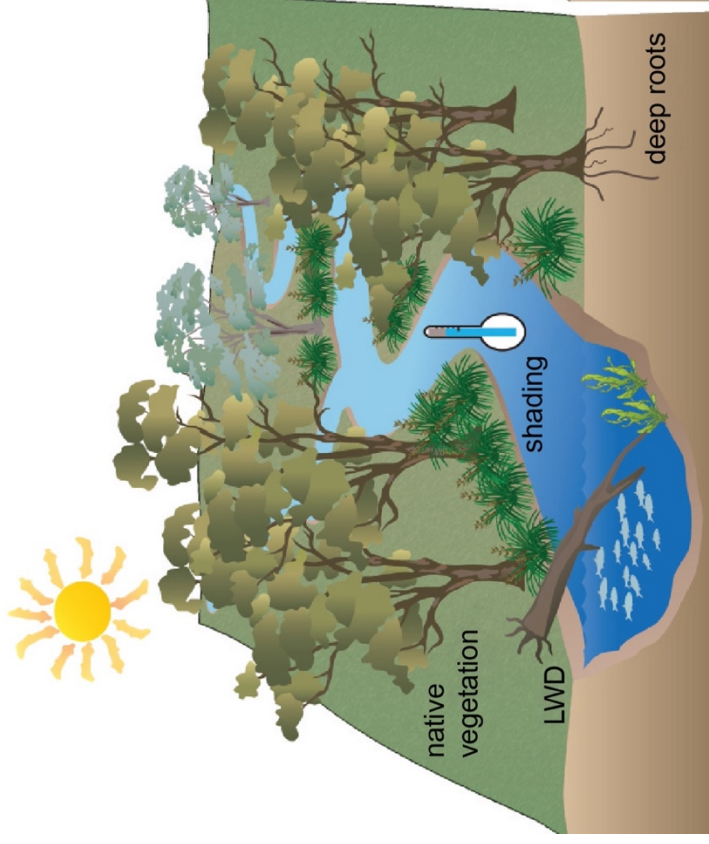
Causes and Effects: wasteful use: water shortages
Solution: conserve water

Apathy

Causes and Effects: uninformed citizenry: polluted streams
Solution: inform others, adopt a stream

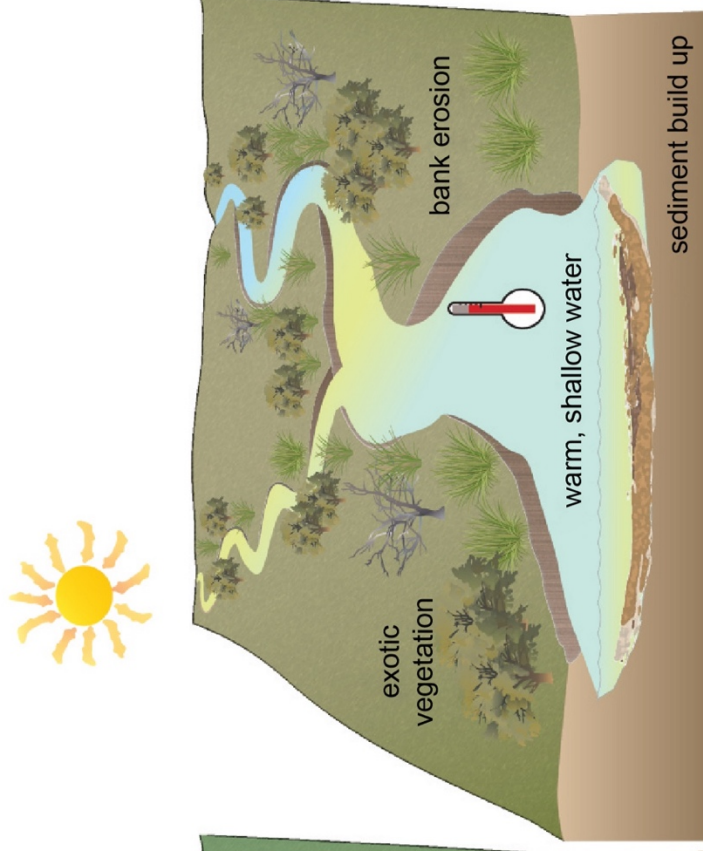
Riparian Vegetation Condition

GOOD



Good vegetation will contract and deepen the channel
Deep roots help maintain bank structure and stability, and reduce erosion
Large woody debris (LWD) provides habitat

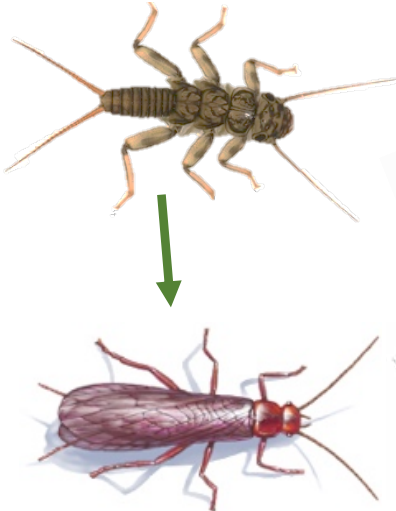
POOR



Without vegetation, the channel will become wider and shallower
Absence or loss of vegetation increases channel instability and erosion
An absence of LWD reduces habitat

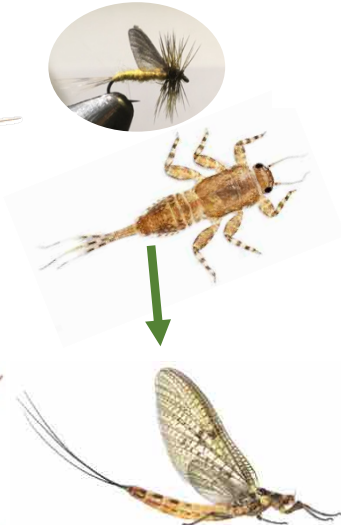
Stonefly

- Needs clean water.
- Adults survive a few weeks to lay eggs that adhere to rocks underwater.
- Nymphs typically have mouthparts adapted for chewing, and many eat plant material.
- Other nymphs are carnivorous, eating smaller aquatic invertebrates.



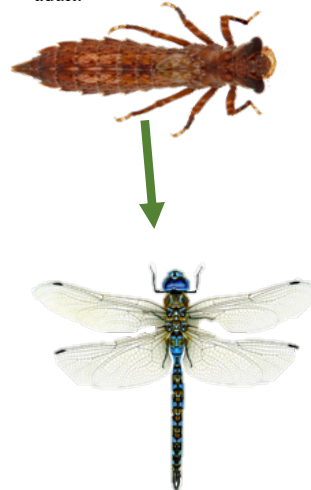
Mayfly

- Their immature stages are called "nymphs" or "naiads" whose presence indicates a clean unpolluted environment
- Mayflies "hatch" (emerge as adults) from spring to autumn in enormous numbers.
- Fly fishermen make artificial flies to catch trout.



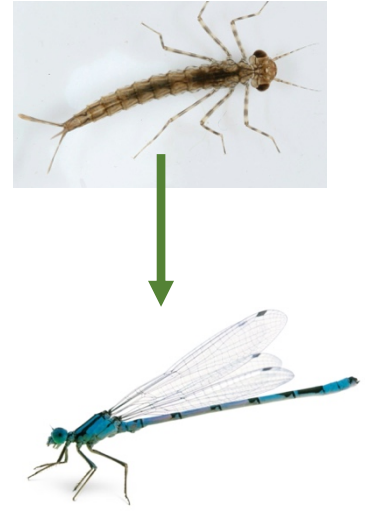
Dragonfly

- Dragonflies found in fossils from 325 million year ago had 30-inch wingspans
- Nymphs are voracious eaters feeding on mosquito larvae, small fish, and tadpoles.
- A single adult dragonfly can eat hundreds of mosquitos in a day.
- Dragonfly nymphs will crawl out on a plant, shed their skin and "inflate" into a winged adult.



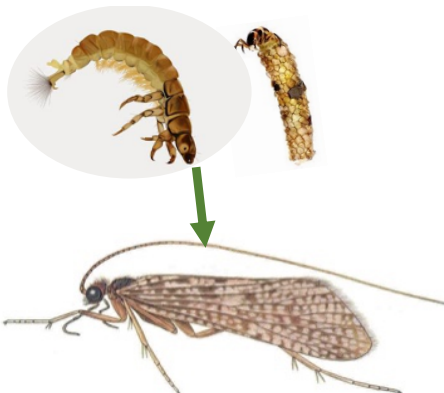
Damselfly

- All damselflies are predatory: both nymphs and adults eat other insects
- The nymphs molt repeatedly, at the last molt climbing out of the water to undergo metamorphosis. The skin splits down the back, they emerge and inflate their wings and abdomen and gain their adult form.



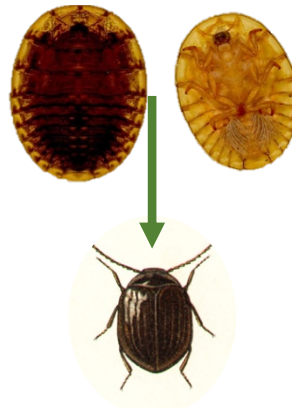
Caddisfly

- Aquatic larvae, many eat detritus, including bits of leaves, algae, and organic matter. Others are predatory, feeding on aquatic invertebrates and other small prey they can subdue.
- Caddisflies larvae create portable cases made from pebbles and sticks.
- Caddisfly cases are open at both ends, the larvae drawing oxygenated water through the posterior end, over their gills, and pumping it out of the wider, anterior end.



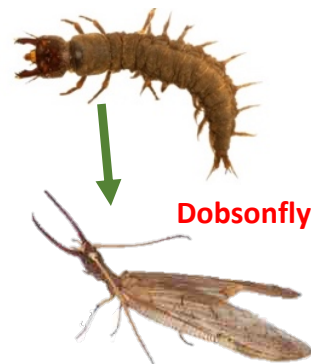
Water penny Beetle

- The larvae use suction to stick to the rocks as they crawl over rocks feeding on algae.
- They are found in found in riffles and streams with a moderate or fast current, clinging to the underside of logs or rocks.
- If you inspect the underside of a water penny, you will see 6 legs in the thorax region and tiny feathery gills under the abdomen.
- Attached to the legs are scrapers, which are used to scrape the algae from the surface of a rock.



Hellgrammite

- Hellgrammites have pinchers and prey on other aquatic insects and small fish
- Dobsonflies are huge and look a lot like moths. But moths never, ever have pincer mouthparts.
- The adult male uses its large tusks for claspng the female during mating.
- Egg masses are laid on branches or rocks next to streams. These masses resemble bird droppings, which protects them from predators.



Dobsonfly

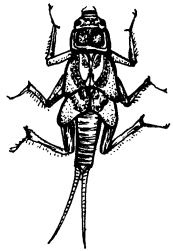
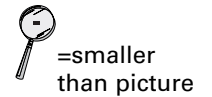
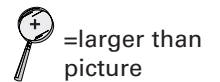
Crayfish

- Crayfish are freshwater crustaceans resembling small lobsters. (to which they are related)
- Crayfish are eaten worldwide.
- Crayfish often conceal themselves under rocks or logs. They are most active at night, when they feed largely on snails, insect larvae, worms, tadpoles, and vegetation.
- They also feed on decaying matter and detritus: scavengers.



Group 1: These are sensitive to pollutants. Circle each animal found.

Relative Size Key:



Stonefly Nymph



Dobsonfly Larva



Alderfly Larva



Water Snipe Fly Larva

No. of group

1 animals

circled:

Group 2: These are semi-sensitive to pollutants. Circle each animal found.



Caddisfly Larva*



Caddisfly Larva*

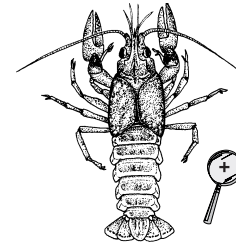


Caddisfly Larva*

***All Caddisfly Larva=1**



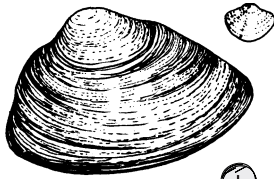
Dragonfly Nymph



Crawfish



Cranefly Larva



Freshwater Mussels or Fingernail Clams



Mayfly Nymph



Damselfly Nymph



Water Penny



Riffle Beetle

No. of group

2 animals

circled:

Group 3: These are semi-tolerant of pollutants. Circle each animal found.



Blackfly Larva



Non-Red Midge Larva



Snails: Orb or Gilled (right side opening)



Amphipod or Scud

No. of group

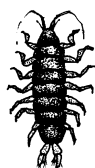
3 animals

circled:

Group 4: These are tolerant of pollutants. Circle each animal found.



Pouch Snail (left side opening)



Isopod or Aquatic Sowbug



Bloodworm Midge Larva (red)



Leech



Tubifex Worm

No. of group

4 animals

circled: