Wetland Slough Ecosystem Poster

TEACHER'S GUIDE

Introduction

Since 1995, we have been inviting teachers to investigate our flowing river systems through a series of posters from small streams to big rivers. This year we step into a new ecosystem, the wetland slough. Bring your knee boots and insect spray, but plan on an exciting adventure.

There are a variety of wetland ecosystems ranging from moving water to impounded lakes to areas that are only wet some part of the year. For this poster, we selected an important system that is found in close proximity to the river system we have earlier depicted. This is the Wetland Slough. It is repeatedly flooded as the associated river rises into the flood plain. Sometimes the slough is simply a part of a former channel that is deep enough to maintain water after the flood event. In that case it could also be classified as an oxbow lake, another name for a wetland.

Regardless how they were formed, wetland sloughs offer a great opportunity to explore and understand various aspects of our natural aquatic systems. This teacher's guide will introduce the reader to various natural functions, show how certain fish use wetlands as a "nursery", and peak the interest with some new and interesting creatures not commonly encountered.

The entire poster series and teacher guides have been created through funds from the Sport Fish Restoration Program. **The goal is to educate all people on the importance of healthy aquatic systems and their relationship to lifelong aquatic recreation.** Each section of this guide is intended to give you, the teacher or youth leader, knowledge on the given subject followed by activities. For Kentucky teachers, one KERA Academic Expectation follows each activity to illustrate various expectations that may be accomplished with this guide.

To improve our efforts, please fill out the evaluation on the following page. If you adapt other activities to this poster, please include basic information and we can pass that on to other teachers in the future. Please send all comments to:

Aquatic Education Administrator
KY Dept. Fish and Wildlife Resources
#1 Game Farm Rd.
Frankfort KY 40601
(800) 858-1549
lonnie.nelson@mail.state.ky.us

EVALUATION

Name: ____ Grade taught: ________________________________

School: ____ Phone: ________________________________

Address: ____ e-mail: ________________________________

1. I received my Small Stream Ecosystem poster and teacher's guide from the following source.

2. On a scale of one to ten, please evaluate the poster in comparison to similar materials you have received.

1 2 3 4 5 6 7 8 9 10

3. What did you like most or least about the poster to rate it as you did?

4. How have you used this poster?

5. On a scale of one to ten please evaluate the teacher's guide you received in comparison to other similar products?

1 2 3 4 5 6 7 8 9 10

6. What did you like most or least about the teacher's guide to rate it as you did?

7. What other aquatic related materials would you find useful in your class or youth group?

ADDITIONAL COMMENTS (*PLEASE INCLUDE HERE ANY ACTIVITIES YOU HAVE DEVELOPED FROM THIS POSTER*):

I REQUEST THE FOLLOWING:

_____ Contact me with Project WILD training opportunities.

_____ Please send _____ copies of Small Stream Ecosystem for teachers at my school.

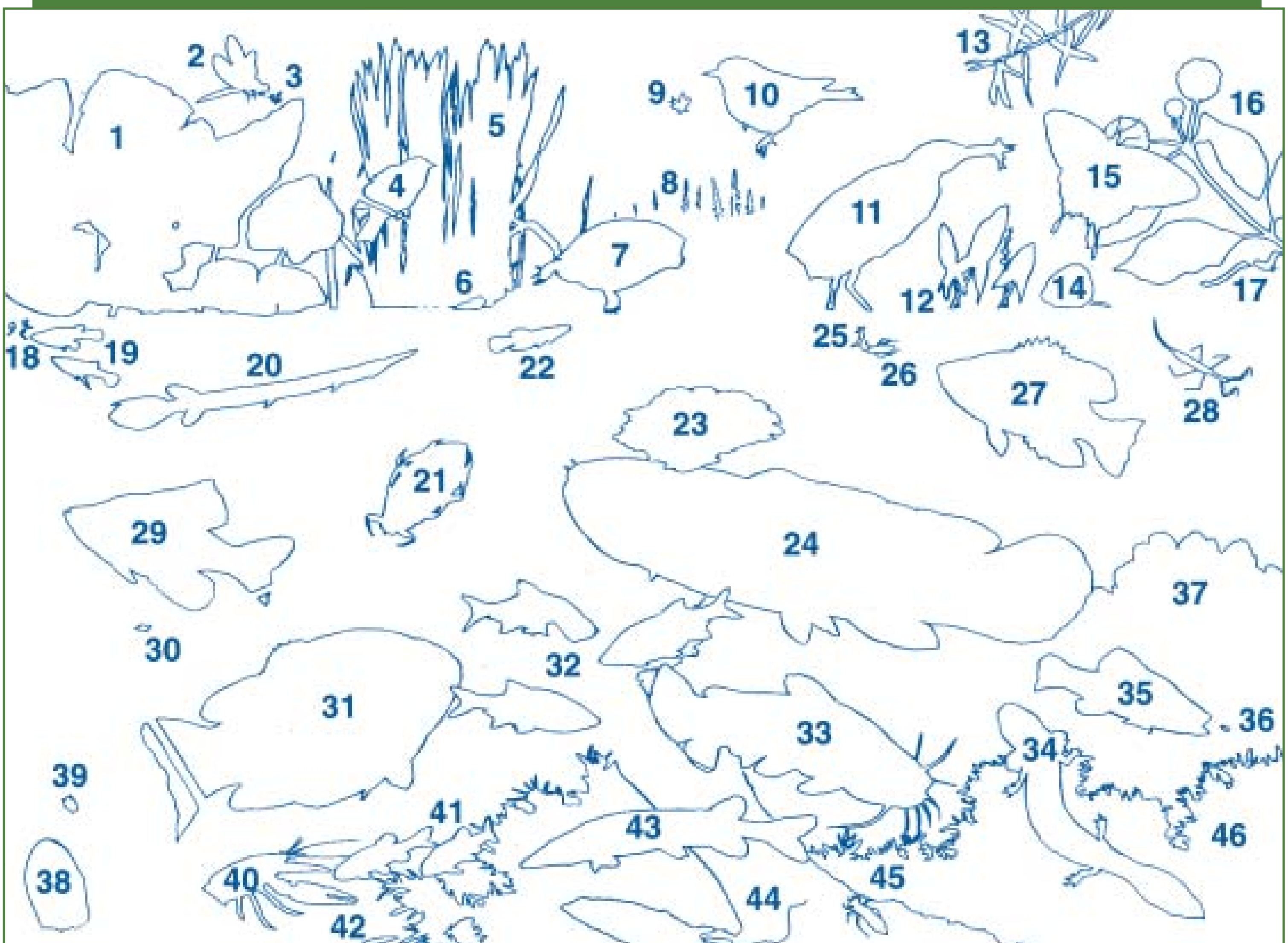
_____ Please send _____ copies of Stream Ecosystem for teachers at my school.

_____ Please send _____ copies of Big River Ecosystem for teachers at my school.

_____ Please send _____ copies of Wetland Slough Ecosystem for teachers at my school.

_____ Other

Common and Scientific names



Notes

1. Common spatterdock — *Nuphar advena*
2. Green darner dragonfly — *Anax junius*
3. Midge — *Tanytarsus* spp
4. Red-winged blackbird — *Agelaius phoeniceus*
5. Common cattail — *Typha latifolia*
6. Bullfrog — *Rana catesbeiana*
7. Painted turtle — *Chrysemys picta*
8. Cardinal flower — *Lobelia cardinalis*
9. Fishfly — *Chauliodes* spp
10. Prothonotary warbler — *Protonotaria citrea*
11. Green heron — *Butorides striatus*
12. Arrowhead — *Sagittaria latifolia*
13. Black willow — *Salix nigra*
14. Muskrat — *Ondatra zibethicus*
15. Eastern tiger swallowtail — *Papilio glaucus*
16. Buttonbush — *Cephalanthus occidentalis*
17. Midland water snake — *Nerodia sipedon pleuralis*
18. Mosquito pupa — *Aedes* spp
19. Mosquitofish — *Gambusia affinis*
20. Shortnose gar (immature) — *Lepisosteus platostomus*
21. Giant water bug — *Lethocerus americanus*
22. Blackstripe topminnow — *Fundulus notatus*
23. School of fingerling bowfin — *Amia calva*
24. Bowfin — *Amia calva*
25. Midge pupa — *Tanytarsus* spp
26. Common backswimmer — *Notonecta undulata*
27. Warmouth — *Lepomis gulosus*
28. Brown waterscorpion — *Ranatra fusca*
29. Black crappie — *Pomoxis nigromaculatus*
30. Snail — *Aplexa* spp
31. Largemouth bass — *Micropterus salmoides*
32. Golden shiner — *Notemigonus crysoleucas*
33. Brown bullhead — *Ameiurus nebulosus*
34. Mudpuppy — *Necturus maculosus*
35. Pirate perch — *Aphredoderus sayanus*
36. Crawling water beetle — *Haliplus fasciatus*
37. Coontail — *Ceratophyllum demersum*
38. Paper pondshell — *Utterbackia imbecillis*
39. Predacious diving beetle — *Dytiscus* spp
40. Crayfish — *Procambarus* spp
41. Fathead minnow — *Pimephales promelas*
42. Fishfly larva — *Chauliodes* spp
43. Grass pickerel — *Esox americanus vermiculatus*
44. Hairworm — *Paragordius varius*
45. Green darner nymph — *Anax junius*
46. Southern naiad — *Najas guadalupensis*

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Two Minute Refresher On the Water Cycle

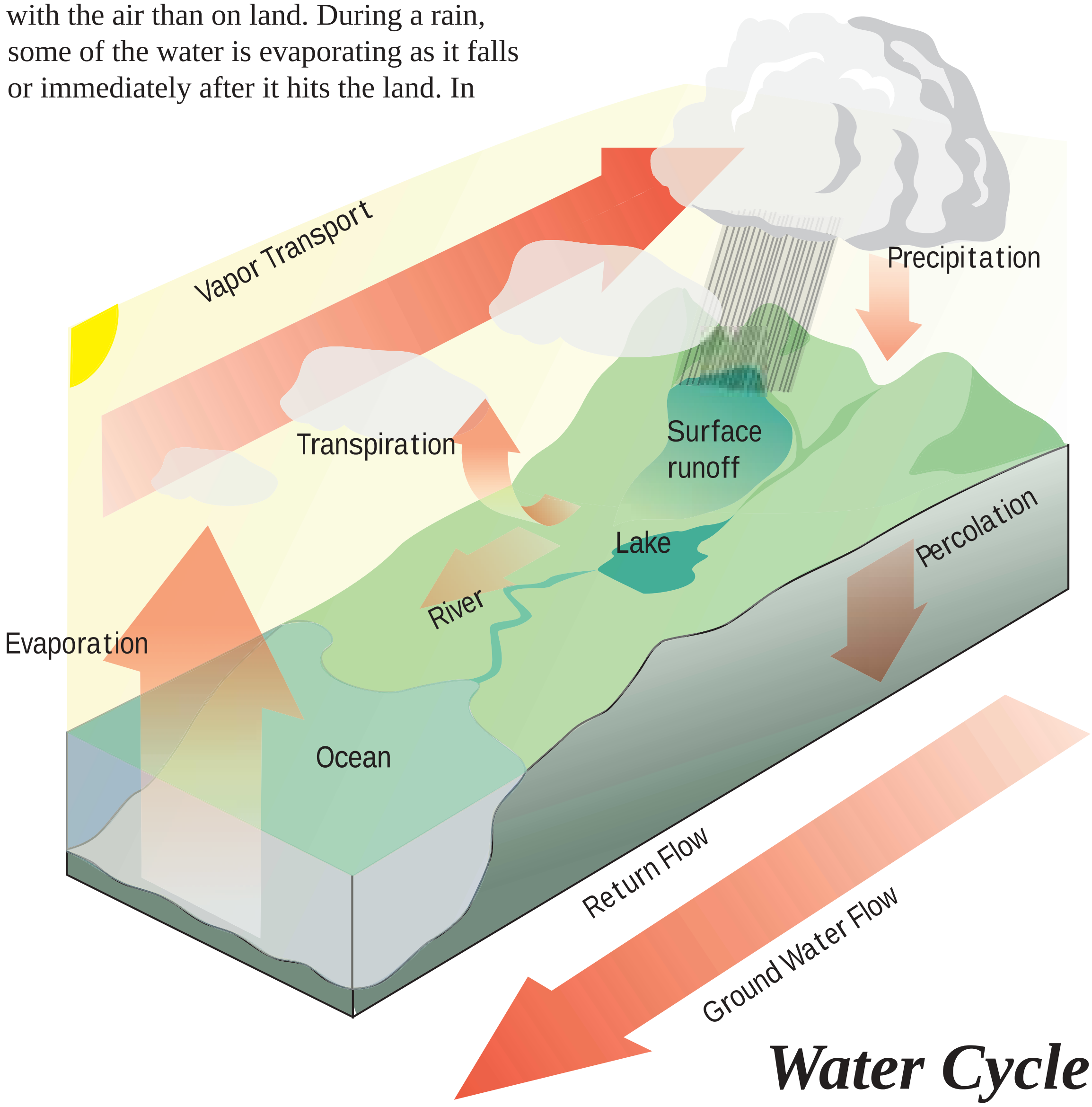
If we all go back to our youth we will remember lessons on how water got from oceans to our community and back to the ocean. This particular refresher will concentrate on the community itself and the contribution made from the wetland.

Because we studied hard, we remember that the water falling on the landmass is in the atmosphere because of evaporation. That happens over water and land, but more so over water because there are more molecules of water in direct contact with the air than on land. During a rain, some of the water is evaporating as it falls or immediately after it hits the land. In dry climates, rain can be seen falling from clouds but it never reaches the surface. It all or nearly all evaporates as it falls. This is called "virga".

As plants create food through photosynthesis, the byproducts are oxygen and water. This water, from the process known as "transpiration" also evaporates to contribute to the atmospheric moisture.

With all that evaporation, one would think there's lots of water in the earth's atmosphere. WRONG. In fact, the total atmosphere around our earth is about .035 percent water. Of course that is concentrated in the lower levels which is why we have such highly enjoyable high humidity days in the dog days of summer.

Once water hits the land surface sev-



Water Cycle

eral interesting things happen. While erosion, splashing, storage in plants, and many other factors are all very interesting, we want to concentrate here on the flow of water over the surface and through the soil.

Surface river ecosystems are defined in length and width, and ground water systems give watersheds the third dimension, depth. However, underground flow does not necessarily follow the same watershed definition as surface water. Ground water may flow under the ridgeline that defines the surface watershed and emerge in the next valley or many valleys away. However, it can not flow uphill, and therefore if it is in Kentucky, it is part of the Mississippi watershed.

Runoff water is created when the land surface is saturated and water can no longer be absorbed. If the surface is asphalt or shingles (man-made materials in human developments) this occurs immediately. This water is hurried out of town, into the nearby river, and down the watershed. If the raindrops hit in an area where it can penetrate the surface, some seeps through the soil to feed the ground water system until the soil is saturated. Soil has air pockets, often created by worms or other organisms in the soil, and the water flows downward through these air spaces. The two functions that drive this water penetration are gravity and water pressure from saturated soil above. When the upper levels of soil are saturated, a portion of the water still penetrates, but a great deal flows along the surface and into flowing water systems.

In a wetland ecosystem, the water pressure is much higher. If there is water standing in the wetland, some certainly evaporates, but the standing water exerts pressure on the water below to penetrate the soil. Because the initial layers of soil beneath the water are layers of decayed plants and animals, the water can soak in readily and be filtered in the process. Therefore, a great deal of the water from a wetland enters the ground water system. When the wetland eventually fills and becomes a wet meadow, it still has more water pressure due to super saturation and will still contribute more water to the ground water system than non-wetland soil.

Water that enters the ground water system may reenter the surface water system through springs. Springs may be evident on the terrain or they may emerge underwater within a river system. This portion of the ground water is fairly shallow. A period of a few weeks with no rain may dry up springs but they flow again within a few days of a significant rainfall.

Water may also continue deep into the ground and become part of an aquifer. Here water may remain for centuries, as is true of the Ogallala aquifer of the Great Plains. This type of water system is replenished very slowly and long-term human use may exceed the ability of natural replenishment.

As this "refresher" is included for teacher information, no activity is included.

The Wetland – More Than Just a Pretty Face

Wetlands "Types"

When you say the word "wetlands" to the majority of people, they envision a swampy, smelly place where the water is stagnant and mosquitoes flourish. In fact, all aquatic ecosystems are included in the classification of "wetlands". Rivers, ponds, reservoirs, estuaries, swamps, and intermittently wet fields are all considered "wetlands". Each of these systems is then subclassified. While all the scientific words and classification are important to ongoing scientific study, to use them in this discussion might confuse potential users.

The important thing for the teacher and student to understand is that the ecosys-

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tem depicted in this poster is one of many kinds of wetlands. Wetlands have been created by flooding, rivers changing channels, ancient glaciers, animals (beavers), and earthquakes. Each individual wetland is unique in its origin and its stage of succession at the moment we study it. The “wetland slough” depicted would have probably been created by a river flooding an old channel or depression in the floodplain. This picture shows a situation with a wide variety of organisms, indicating the system would be in “the prime of life” in terms of succession.

Wetland Functions

Wetlands provide a variety of meaningful functions associated with the water cycle. Perhaps the most obvious is flood control as water is stored in wetlands during and after a flood rather than continuing down the flooded river. The loss of this value is emphasized in those areas where wetlands have been minimized, drained, filled or in some way altered. Floods in these watersheds are amplified and often much more devastating.

In many ways the wetland resembles a sponge. The water enters from the surface, either directly from surrounding land or from a river that is rising out of its banks. As the wetland fills, the water pressure pushes the water out of the bottom, replenishing the **underground water table**. In some cases this water emerges in the nearby river as a spring, either on the bank or underwater. It may also travel downstream many miles in underground channels such as the waterway found in Mammoth Caves or it may be used for water supply via wells.

This process of water entering at ground level and entering the ground water system is a natural filtering system. First, the vegetation in the water uses some nutrient material suspended in the water for growth. As the water **leaches** into the ground, remaining particles are filtered out in the different soil layers in the earth.

Over a very long period of time, this process, along with the decaying of plant and animal material, facilitates the succession of the wetland into an infrequently flooded area, then into a wet meadow. Because of **hydric soil**, soil that is somewhat saturated with water, the wetland area may never be like other fields in our land ecosystems, even after alterations have been accomplished.

The hydric soil is a prime reason that some areas flood when there is heavy rainfall even though there is no apparent source of incoming water. If this soil is covered with topsoil, as often happens “to improve wetlands” in human communities, the hydric soil beneath keeps water from draining into the lower levels and drowns the plants

that we are attempting to grow in the soil above. When there is enough rain, the water emerges from below and floods the area.

Another basic function of wetlands occurs when plants and animals break down chemicals in the water so they can be used. When floods occur, they carry chemicals that we may think of as pollutants. Animal waste, fertilizers and pesticides from agriculture and lawns, and waste materials from automobiles are some of these polluting agents. In wetlands, plants and animals can break down many of the pollutants into forms that are used by plants. If a pollutant, such as oil, overwhelms the life, however, this function may be eliminated.

The dissolved oxygen levels can vary greatly in wetlands. Because they are very rich in nutrients, plants thrive and produce high levels of oxygen when there is sunshine. However, when the plants die and decompose, this process uses oxygen. This can cause oxygen levels to go below that level required by many resident fish and could result in a fish kill. Many wetland species can survive at low oxygen levels, and two species depicted in the poster can survive extremely low oxygen conditions. Both the short nosed gar and bowfin can gulp air into their "lung", from which they can take the oxygen. In fact, bowfin can survive periods of drought by lying in a **torpid** state in muddy burrows breathing through this "lung".

Biologically, wetlands are considered to be the ecosystem with the highest degree of **biodiversity** in North America. The only system in the world that is higher in biodiversity is the tropical rainforest. High diversity is easily explained, as the nutrients gather over long periods of time creating an environment for a wide variety of plants to grow. Generally, wetlands are also reasonably shallow which allows them to warm up early in the spring and stay warm late in the fall. All this equates to lush plant growth.

When plants grow in the water, animals will follow. The food web becomes much more extensive as different species fill each given niche. In addition, the growth on the edges of the wetland provides hiding cover for many animals that may need both terrestrial and aquatic habitat. Finally, this haven of food attracts many migrating birds and insects.

One very interesting aspect of wetlands is the relationship with the loss of wetlands and endangered species. Many of the species that are currently on the endangered list have distinct relationship to wetlands. As we reduce the habitat by eliminating wetlands, these endangered species face even greater adversity. This is a key element of **wetland restoration** within national agencies.

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Soaking a Sponge

(*See Wetland Metaphors, Project WILD, Aquatic.*)

A wetland soaks up water much like a sponge. The water enters on the surface and may or may not set on top the land. Many "wetlands" have a slightly damp or even dry surface much of the year.

Using a sponge from home cleaning supplies or from the store, have students measure the amount of water that is needed to saturate the sponge. Hold the sponge aloft so they can see the moment the water begins to leak. They should form a hypothosis on where the water will exit the sponge when saturated. The water should come out the bottom of the sponge as gravity pulls it through unless the water is poured too rapidly (flood conditions).

Holding the saturated sponge over a container, pour a given amount (i.e. 1 cup or 100 ml) slowly onto the sponge. Now measure how long it takes for the sponge to stop leaking. Then measure how much water leaked through into the container. If there is slightly less water in the container than poured on, was the sponge really saturated? Is it done leaking?

KERA Learner Outcome 2.3. Students identify and describe systems, subsystems and components and their interactions by completing tasks and/or creating products.

Pond Succession,

Project WILD, Aquatic Edition

Ponds of all sizes go through **succession** just as any other ecosystem. The Natural Resources Conservation Service in your community (look under US government, Dept. of Agriculture) can help you identify ponds at different stages. A new pond will have little growth in the water, and the banks will be reasonably barren. As the pond matures, the use of the pond and surrounding landscape will determine how the plants grow in and around the pond. Very old ponds are essentially wetlands with little water storage.

Have students bring pictures of ponds from the neighborhood. Then have them arrange the pictures according to successional stage. Have them write a story to describe various functions. For instance, how is each stage used by the landowner for watering livestock? When is the fishing in the pond best, and why does it change? How does land use in the watershed affect the pond's succession?

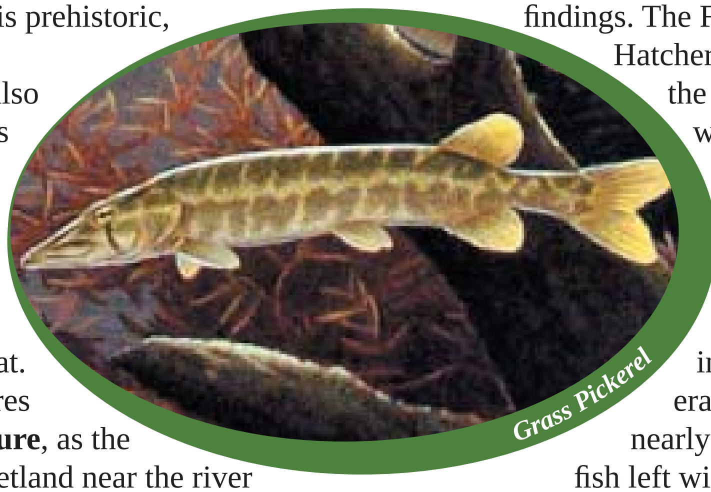
KERA Learner Outcome 2.5. Students understand the tendency of nature to remain constant or move toward a steady state in closed systems.

Rock-a-bye Baby Bowfin

One of the key biological processes in wetlands is growth from early life to adulthood for all species. In humans we refer to the habitat for babies as their nursery, and the same term applies to fish. Wetlands provide an excellent "nursery" for young-of-the-year fish to grow rapidly. This growth gives them enough energy to survive their first winter and to be large enough to escape larger predators. Winter and predation are the two main causes of death for young-of-the-year fish.

Some fish spend a great deal of their lives in the wetland and depend on this habitat as a place for reproduction. A good example of this would be the bowfin. As depicted in the poster, the bowfin male defends the brood that swims in a very tight ball for several weeks. As bowfin are large fish, other predators will rarely challenge this prehistoric, toothed fish.

Bullheads are also prolific reproducers in wetlands. When the first flood occurs, however, bullheads will leave the wetland and find new habitat. This function ensures good **genetic mixture**, as the brood stock of a wetland near the river mixes with every flood event.


Grass Pickerel

The grass pickerel depicted in the poster is a small member of the pike family that is normally found in wetlands. This entire family relies on flooded vegetation as spawning habitat. Therefore, efforts to eliminate flooding also eliminate the opportunity for these fish to reproduce.

A unique salamander commonly found in wetlands and nearby streams is the mudpuppy. One of a few salamanders that never completely changes from gills to lungs, the mudpuppy may grow to be a foot long. The external gills may be more pronounced in water with low oxygen than they would be if the mudpuppy were found in a highly oxygenated stream. Mudpuppies mate in the fall; then the female holds the sperm until spring when she lays fertilized eggs.


Mudpuppy

Many fish enter the wetland habitat as young-of-the-year and grow there for some period. If the water levels rise again and the water is again interchanging with the nearby river, these fish may go with the flood back into the river habitat.

Normally when a wetland over flows, the largemouth bass and catfish would be expected to escape with the high water. However, the Kentucky flood of 1997 (an extreme flood) provided some interesting findings. The Frankfort Fish Hatchery located in the Elkhorn Creek watershed had many ponds (a type of wetland) flooded. Channel catfish were being held in several ponds and nearly all of the catfish left with the flood, as expected. However, some ponds held largemouth bass before the flood and nearly all of them were still in the ponds when the flood receded.

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Who Fits Here?

Project WILD K-12

Have each student find a variety of fish pictures from magazines or booklets. During class, arrange them by habitat preference. Which ones would possibly be found in a wetland, a warm water river, a cool water stream, etc.? Classes can access the Kentucky Fish Book at this web site to help determine best habitat for different fish. What life functions make it important for each fish to be in a given habitat? Which ones are **specialists** and which ones are **generalists**?

Lifestyle research.

Assign each student one animal either from the poster or other wetland publications. Have the students work independently on identifying specifics about their animals lifestyle.

After all students have discussed their given animals, have the students build a classification chart. They could first classify by normal means: fish, birds, mammals, insects, worms, crayfish, etc., then have the students classify them by lifestyle. Which are predators, prey, or parasites? Another classification might be plant eaters, plankton eaters, omnivore, **piscivore**, etc.

KERA Learner Outcome 1.10. Students organize information through development and use of classification rules and classification systems. (Both activities)

Unusual Inverts

The wetland ecosystem is home for many **invertebrates**. While most of these animals could be found in other habitats, we have depicted them in this poster to demonstrate the great variety of animals and functions in wetlands. While most aquatic related insects have a larval stage in the water and the adult flying nearby, the following insects are found in the water as adults.

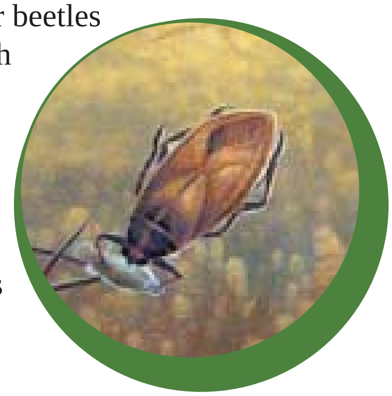
PREDACIOUS DIVING BEETLE

The predacious diving beetle is a very interesting predator. In fact they are aquatic predators in both larval and adult stages. There is also evidence that adults are scavengers as well as predators. Most commonly found as adults, they dive deep into the water and seize young fish in their **pincers**.

Adults are also able to fly to another aquatic ecosystem. To do so they use "air sacs" under their wings. As they emerge and need to fly to another ecosystem, they crawl out of the water, inflate the sacs, and fly away. Arrival is accomplished with a clumsy water landing. They immediately deflate the sacs so they can dive in this new habitat.

There are over 500 species of predacious diving beetles in North America. In the depicted species, the female deposits eggs inside the stems of vegetation near water resources. Other species may lay eggs in damp soil or on the leaf surfaces. In all species, larvae make their way to the water for their predacious life style.

GIANT WATER BEETLES



Giant water beetles are divers much like the predacious beetles. To obtain air for their dives, they extend breathing tubes from the tip of their abdomen to the ambient air. Their back legs are flattened to aid in swimming, while their front legs are developed to seize their prey. Once they attack a prey specimen, they thrust their powerful beak into the prey and suck out the juices. They can become a nuisance at hatcheries where they eat the young fish or at swimming pools where they fly to the lights. While they are large and visible, they apparently are unfavorable as prey for most fish due to scent glands. However, in Mexico and Asia, related insects are considered delicacies by humans…YUM!!

Giant water beetles lay their eggs on the aquatic vegetation. However in some closely related species, the female lays the eggs on the back of the male where the eggs remain until they hatch. Larval stages of giant water beetles are very similar to adults only smaller. The legs of larvae have only one segment while adults are segmented.

BROWN WATERSCORPION

The brown waterscorpion is another predator found in wetlands and related ecosystems. It is a poor swimmer, and is much more efficient when it hides in the vegetation and waits until small fish, tadpoles, or insect larvae get too close. Waterscorpions seize their prey with their front legs, then inject their prey with a salivary secretion which anesthetsizes the prey and begins digestion. The waterscorpion then sucks the body juices from the prey. It is able to stay underwater for long periods because it breathes through a tube in the tail.

Waterscorpions thrust their eggs into the soft tissue of living or dead aquatic vegetation. When they hatch, the larval stage looks very similar to the adult only smaller. The adult stage is reached by fall, with adults over-wintering to reproduce the next year.

OTHER INVERTEBRATES

HAIRWORMS

Hairworms are members of a reasonably small phylum, Nematamorpha. There are only about 100 species in this phylum, with all but one found in fresh water. At least three families and eight genera are found in the United States.

An untrained investigator might easily overlook hairworms in a sample of aquatic life. They are usually found in vegetation, may be found singly or in a group, and move very slowly, especially in cool water. When found together, they appear to be wiry root masses rather that separate animals. Each individual can be over a foot long. Hairworms were once thought to be a product of horse hairs developing into separate living worms (hence the name). Although we have learned a great deal about hairworms through scientific research, there is still much to be learned.

Hairworm adults have one function: mate, lay eggs and die. While they have a digestive tract, the animal does not eat as an adult. After mating, the female lays strings of eggs, which number in the millions. Depending on water temperature, the eggs incubate in 15 to 80 days. Within 24 hours of hatching, the microscopic larvae encyst on the vegetation in or near the water. These **cysts** remain viable for up to one month in moist areas near the water or two months if they are in the water. Eventually, some of them are eaten by a variety of **grazing animals**.

When the tiny cyst is eaten by a grasshopper, cricket, or beetle, the next stage of the hairworm breaks through the intestinal wall of the insect and develops as a **parasite** in the body cavity. There may be multiple worms in the body of one host. Scientists believe that many other animals (including snails,

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aquatic insects, fish and humans) ingest the cysts, but are not acceptable hosts.

When a hairworm is near or at maturity and the appropriate host animal is wet (rain, dew or immersion), the worm breaks through the body of its host. (Some scientists believe the hosts go to the water, perhaps dehydrated, when the worms are ready to emerge.) If it is in or near water when it emerges, the hairworm survives. But those without immediate access to water die. The life cycle is believed to take from two to 15 months.

CRAYFISH

Although crayfish may seem to all be alike, there are approximately 55 species in Kentucky. Some live in streams all their lives; others in the same stream may come out of the stream and burrow into streamside banks. The cave crayfish are unique, but so are those species that never go to water at all, but burrow in wet meadows. Some crayfish species are found only in one of our major river basins, while others are widespread over numerous rivers.

The greatest species diversity of crayfish is in the Southeastern United States. As you go north and west or north and east, the species variety decreases. In most parts of the Rocky Mountains they are absent, but a few species are invading toward the Rockies from both directions. There are only a few species found in states on the west coast, and the New England states also have only a few species.

Crayfish primarily eat vegetation or **scavenge** on dead material. They use the claws to grasp, crush, and rip their food. Having five pairs of legs, they belong to "Decapoda" or ten feet. When they break or lose one of their legs, as they often do when fighting each other or escaping from predators, they have the ability to regenerate a new one.

Reproduction may occur from spring through fall, depending on the species. Males deposit the sperm, which is stored by the female for several weeks to several months. When the female is ready to lay eggs, she creates a mass on her abdomen, releases the sperm, then lays the eggs. The fertilized eggs attach to her abdomen by a stalk and she is said to be "in berry". The eggs hatch into tiny crayfish that are then released and on their own.

In colder climates, crayfish are believed to live no more than two years with very few having two reproductive cycles. However, there is evidence that some crayfish in states such as Mississippi and Alabama may live as long as six or seven years.

Truth or consequences (*suggested for middle or high school*).

In the aquatic world, some things seem stranger than fiction. There are many animals, from microscopic to fully visible that are fascinating to investigate.

Divide the class into five or six groups. Assign an animal or group of animals to each group of students. Have them research the assigned animal/group. Within their oral report, have them include myths, stories or old wives tales (hairworms coming from horse hairs) they find. Some truths (giant water bugs and waterscorpions breathing through a posterior tube) may seem fanciful, but research can determine the truth.

After each report, the entire class should discuss each animal and logically disclose those things that might not be true.

KERA Learner Outcome 4.2. Students use productive team membership skills.

Fashion an Invert (*adapt from Fashion a Fish, Project WILD, Aquatic Edition*) Recommend for grades K-4.

Follow directions of the basic activity except have students use invertebrates instead of fish. Teacher may want to assign specific functions that the animal would need to accomplish to help students visualize what it would look like.

KERA Learner Outcome 2.4. Students use models and scale to explain or predict the organization, function, and behavior of objects, materials, and living things in the environment.

Glossary

Biodiversity – A great mixture of living things. For complete explanation of the various types of biodiversity, refer to the Stream Ecosystem Poster teacher's guide.

Cysts – In some animals, a stage of development where a larva is enveloped in a hardened shell awaiting the next stage.

Generalists – Organisms that can survive in a variety of situations, adapting well to different available food.

Genetic mixture – The process of having individuals within a species having slight variation of genetics and mixing that variation during reproduction.

Grazing animals – Animals that eat plants in any ecosystem.

Hydric soil – Soil that does not drain well, retains water.

Invertebrates – Animals that do not have a backbone or spine.

Leaches – The process of water moving slowly through a system, usually into the ground water system. Chemicals can also leach through the soil in the water.

Parasite – Organisms that get their energy from another organism without killing the host. If the host dies from depletion of energy, the parasite becomes a predator.

Pincers – Small structures on the end of limbs that allow an organism to grasp.

Piscivore – An animal that eats fish.

Scavenge – The process of eating dead material to gain energy.

Specialists – Organisms that are very specific in their life style and can not adapt to new situations.

Succession – The process where an ecosystem moves from one natural state to another.

Torpid – A state where an organism is very inactive, surviving until the ecosystem is altered to allow normal activity.

Underground water table – That water that is in the soil moving through the watershed underground.

Wetland restoration – The process of allowing a natural wetland ecosystem to once again serve natural functions rather than having been filled or drained.