KENTUCKY AQUATIC WILD CARDS

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INTROD UCTION

Welcome to Kentucky's Aquatic Wild Cards, featuring the art of Rick Hill, artist for the Kentucky Department of Fish and Wildlife Resources. The Kentucky Aquatic Wild Cards program is a collaboration between the WAVE Foundation at the Newport Aquarium and the Kentucky Department of Fish and Wildlife Resources. By introducing all people to Kentucky's biodiversity, we hope to instill knowledge and respect for the organisms living in the same environment as you and me.

Two complete decks of cards representing 104 organisms and 4 ecosystems make up the Kentucky Aquatic Wild Cards. Each deck contains 52 organisms and represents 2 ecosystems. Ecosystems are depicted by the border color on each card and are defined as follows:

Blue Border – Big River Ecosystem
Purple Border – Upland Reservoir Ecosystem
Yellow Border – Stream Ecosystem
Green Border – Wetland Slough Ecosystem

The teacher's guide is broken up into six sections. In the animal information section, you will find a brief description of the particular ecosystem and a fact sheet for each animal. The fact sheet is meant to be a guide to help students determine where an organism fits in the food chain by providing information on what it eats and is eaten by.

Section 2 contains directions for four different card games and the Alimento board game. All games are tailored to the use of the Kentucky Aquatic Wild Cards and introduce students to topics such as food chains, energy flow and classification. Games are listed from what we believe to be the easiest to most difficult.

The third section includes two classroom activities tailored to the use of the Kentucky Aquatic Wild Cards, followed by suggested follow up activities from Project Wild, Project Wild Aquatic and Healthy Water, Healthy People. Next, you will find a list of Kentucky Core Contet for Science Assessment standards, suggested resources and references and a short evaluation form which will help us improve the teacher's guide in the future.

We would especially like to thank Mills James Production Company for designing the cards, US Playing Cards for printing the cards and The Stillson Foundation, Fifth Third Bank, Trustee for providing additional funding. Our goal is to provide you, our educators, with a unique, hands-on and educational tool in hopes that it will inspire respect and an understanding of all organisms, especially those surrounding the environment in which we live.

Ecosystem posters can be obtained from the Kentucky Department of Fish and Wildlife Resources. Please call 800-858-1549 for more information.

Come inside and explore the wonderful biodiversity Kentucky has to offer.

For more information and updates to the teacher's guide and games, please visit www.kywildcards.fw.ky.gov

SECTION 1

ANIMAL INFORMATION

ANIMAL INFORMATION

What is an Ecosystem?

An ecosystem describes a naturally occurring assemblage of organisms (biotic elements) living together with their environment (abiotic elements). The size of an ecosystem can vary widely. It may be as small as a fallen log or as large as the earth. Different ecosystems are often separated by geographical barriers, like deserts, mountains or oceans, or are isolated otherwise, like lakes or rivers. Because these borders are permeable, ecosystems tend to blend into each other. As a result, the whole earth can be seen as a single ecosystem, or a lake can be divided into several ecosystems, depending on the scale used. More important than size, is the fact that an ecosystem tells a story about how energy and nutrients flow from one organism to another. Studying ecosystems allows biologist to study how organisms behave, grow and adapt to the conditions around them. The organisms in an ecosystem are usually well balanced with the other biotic and abiotic elements within the ecosystem. Introduction of new elements into an ecosystem tend to have a disruptive effect, which can lead to ecological collapse and the death of many native species.

The *Kentucky Aquatic Wild Cards* represent four main aquatic ecosystems commonly found in Kentucky: Big River, Upland Reservoir, Stream and Wetland Slough. Each aquatic animal has specific water conditions and factors in which it is best suited. As long as these same conditions exist in a separate ecosystem, the animal may survive in that ecosystem as well. Many of the organisms depicted in *the Kentucky Aquatic Wild Cards* can be found in more than one, or even all four, of the represented ecosystems.

Big River Ecosystem (Blue Border)

The Big River is an example of an aquatic ecosystem in which many smaller bodies of water have combined to create the big river. A big river is defined by a channel with permanently-flowing water and banks more than 200 feet apart. Millions of gallons of water, shed from a large area of land, move into the big river, mixing the nutrients and pollution from the smaller bodies of water. This drainage area is referred to as a watershed or river basin and contains the big rivers and its tributaries. Watersheds connect the terrestrial environment with the aquatic environment. The landscape, type of rocks and human activity all have an impact on the big river via its watershed. What happens upstream greatly affects what is going on downstream.

For additional information and classroom activities on *Rivers*, please refer to the Kentucky Department of Fish and Wildlife Resources *Big River Ecosystem Poster Teacher's Guide* @ http://www.kentuckyawake.org/templates/habitatsEcosystems/posters.cfm?instanceID=9711

	Organism	Class	Feeds On	Eaten By
5♦	American Eel	Fish	Insects, small fish, crustaceans, salamanders, snails and worms	Larger, carnivorous animals, such as walleye, herons, minks, and otters; humans
10♥	Barred Owl	Bird	Mice and other small mammals, frogs, small birds, salamanders, snakes, crayfish, insects	Great horned owls, wildcats, humans
7♦	Black-Crowned Night Heron	Bird	Mainly fish; also amphibians, shrews, mice, insects, eggs, baby birds	Eggs and young eaten by ravens, crows, gulls, birds of prey, raccoons and black bears
8♠	Blue Catfish	Fish	Other fish, clams, freshwater mussels, crayfish, frogs, hellgrammites, insect larvae	Humans
8♥	Cottonwood	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Field mice, rabbits, deer, and domestic livestock eat the bark and leaves
6♠	Eastern Spiny Softshell Turtle	Reptile	Insects, large and small fish, crayfish, some plant material	Larger individuals not preyed upon (except by humans)
9♣	Emerald Shiner	Fish	Aquatic and terrestrial insects, small crayfish, fish eggs, small fish, algae, detritus	Larger fish
2♥	Freshwater Drum	Fish	Small fish, crayfish, immature aquatic insects; sometimes clams and snails which it crushes	Young eaten by walleyes, muskellunge and northern pike; humans
4♥	Green Darner Dragonfly	Insect	Niaids eat aquatic invertebrates and small aquatic vertebrates such as tadpoles and minnows; adults eat flying insects	Naiads are an important food source for fish, frogs, birds, and other aquatic insects; adults are food for birds, frogs, fish, dragonflies
3♣	Hellbender	Amphibian	Crayfish, snails, and worms	Adults eaten by river otters and raccoons; young eaten by fish, reptiles, mammals, birds and even larger hellbenders.
J♦	Longnose Gar	Fish	Larvae eat crustaceans and immature insects; adults eat fish, insects, crayfish, frogs	Humans
10♠	Muskellunge	Fish	Young eat zooplankton and small fish; adults eat snakes, muskrats, ducks, crayfish, salamanders, and fish; large muskellunge will eat nearly anything that will fit in its mouth	Small fish, crayfish, and predaceous insects often feed on the eggs. Bass and sunfish prey on young muskellunge. Large birds of prey and humans feed on adult muskellunge

	Organism	Class	Feeds On	Eaten By
4♠	Osprey	Bird	Mostly fish; also small mammals, snakes, other birds	Great horned owls, raccoons, ravens and crows will eat chicks
K♣	Paddlefish	Fish	Filter zooplankton and small insect larvae.	Predation is rare because of their large size, but lampreys can weaken the fish
J♣	Peregrine Falcon	Bird	Medium sized birds such as red-winged blackbirds; occasionally a duck	Raccoons eat eggs, owls eat young
Q♥	Ring-Billed Gull	Bird	Fish, insects, plant material, and carrion	Opossums, raccoons, skunks, foxes, hawks and owls
6♥	River Darter	Fish	Aquatic invertebrates, especially midge and caddisfly larvae; will also eat snails	Larger carnivorous fish such as walleye
2♠	River Otter	Mammal	Primarily fish such as catfish and bluegill; crayfish and other aquatic invertebrates; frogs, turtles, birds, small mammals and eggs	Bald eagles may eat pups
3♦	Shovelnose Sturgeon	Fish	Mostly bottom-dwelling aquatic insects, other benthic invertebrates and fish eggs	Humans
Q♠	Silver Lamprey	Fish	Larva feed on drifting plankton and detritus; adults feed on the blood of a variety of fish	Juveniles are eaten by walleyes, smallmouth bass and muskellunge
K♦	Silver Maple	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Quail, wild turkey, songbirds, red fox, chipmunks, and deer; squirrels eat the buds in late winter when food sources are low
9♦	Stonefly	Insect	Adults can eat algae or pollen but many do not feed; naiads eat aquatic invertebrates such as insects, mollusks, and crustaceans	Naiads eaten by fish, frogs, and other aquatic vertebrates and invertebrates; adults eaten by many birds, fish, and invertebrates
5♣	Washboard Mussel	Mollusk	Organic material found in and on the bottom of rivers	Some fish and small mammals
7♣	White Bass	Fish	Worms, mollusks, insects, fry, crustaceans. Small fish such as shad, shiners, and chubs	Humans

Upland Reservoir Ecosystem (Purple Border)

Reservoirs are man-made impoundments that range in size from small farm ponds to huge lakes. The primary purpose for building most reservoirs is flood control. Beneficial secondary purposes and by-products include electrical power generation, water irrigation and human recreation opportunities including fishing, boating and beaches. Upland reservoirs are found reasonably high in the watershed and are typically built on rivers that receive water from numerous small streams or rivers. Each individual reservoir may be drawn down at a different time in anticipation of flooding in the next few months. In the winter, you may see exposed banks, mud flats and trees that had been submerged. But, after a period of heavy rainfall, the same reservoir may be high into the trees on the shoreline. Because each watershed is different in many ways, it is impossible to describe the "typical" reservoir. However, most reservoirs consist of deep, reasonably clear water after the water supply settles down in the summer.

For additional information and classroom activities on *Reservoirs*, please refer to the Kentucky Department of Fish and Wildlife Resources *Reservoir Ecosystem Poster Teacher's Guide @* *http://www.kentuckyawake.org/templates/habitatsEcosystems/posters.cfm?instanceID=9727*

	Organism	Class	Feeds On	Eaten By
8♣	American Coot	Bird	Aquatic vegetation including algae, aquatic invertebrates	Bald eagles, raccoons, coyotes, skunks, and foxes; hunters regularly seek them
5♥	Bald Eagle	Bird	Fish, small mammals, snakes, other birds	Owls eat young bald eagles
9♥	Black Crappie	Fish	Young feed on small invertebrates, such as midges and other insect larvae; adults feed on small fish, such as minnows and sunfish	Humans; fish, such as walleye, bass, and muskellunge prey on young; young and adults are prey for the great blue heron, merganser, snapping turtle, otter, and mink
4♦	Bluegill	Fish	Aquatic insects, worms, small crayfish, plant material and small fishes; smaller individuals and juveniles feed on zooplankton and algae	Larger fish such as bigmouth bass, snakes, birds, turtles and humans
10♦	Brook Silverside	Fish	Crustaceans such as copepods and cladocerans, aquatic and terrestrial insects	Larger fish
3♥	Bryozoan	Bryozoan	Microscopic plankton such as algae	Flatworms, oligochaete worms, snails, mites, insect larvae such as caddisflies and midges

	Organism	Class	Feeds On	Eaten By
K♠	Caddisfly	Insect	Most adults do not feed; larvae eat aquatic plants or aquatic invertebrates such as insects, worms and crustaceans	Fish, such as trout, rock bass, smallmouth bass, and darters; frogs, and other aquatic vertebrates; aquatic invertebrates such as dragonfly and damselfly nymphs, crayfish, hellgrammites, and predaceous diving beetles
2♦	Cliff Swallow	Bird	Flying ants, wasps, grasshoppers, mosquitoes, dragonflies, beetles	Predatory birds, snakes, raccoons, cats
3♠	Flathead Catfish	Fish	Young eat insects; adults eat fish, crayfish, small animals that get into the water	Humans
7♠	Freshwater Jellyfish		Small invertebrates like mosquito larvae and zooplankton	Crayfish
8♦	Giant Floater Mussel	Mollusk	Algae	Raccoons and muskrats
10♣	Gizzard Shad	Fish	Microscopic animals such as copepods and water fleas; adults eat both phytoplankton and zooplankton	Many species of predatory fish, such as striped bass, walleye, largemouth bass, smallmouth bass, and spotted bass
J♠	Great Blue Heron	Bird	Mostly small fish, also dragonflies, grasshoppers, aquatic insects, crayfish, frogs, salamanders, lizards, snakes, turtles, birds	Foxes, minks, hawks and raccoons
7♥	Largemouth Bass	Fish	Other fish, earthworms, insects, leeches, frogs, crayfish, and salamanders, occasionally field mice and ducklings	Humans; young are preyed upon by other fish, including green sunfish
Q♦	Logperch	Fish	Small invertebrates on bottoms of rocks, immature stages of aquatic insects, such as midge larvae, small crustaceans, and snails	Larger carnivorous fish
9♠	Longear Sunfish	Fish	Aquatic insects, small crayfish; small fish, including eggs and young of smallmouth bass and other fish; bryozoans; adults feed heavily on terrestrial insects taken at surface	Larger carnivorous fish, small mammals

	Organism	Class	Feeds On	Eaten By
6♣	Louisiana Waterthrush	Bird	Aquatic and terrestrial insects, crustaceans	Skunks, raccoons, rat snakes, and foxes
2♣	Mayfly	Insect	Adults do not eat; young eat aquatic plants, algae, and small aquatic invertebrates	Many birds, fish, and invertebrates; naiads are eaten by fish, frogs, and other aquatic vertebrates and invertebrates such as dragonfly, damselfly and stonefly naiads, hellgrammites, and predaceous diving beetles
K♥	Raccoon	Mammal	Crayfish, insects such as grasshoppers and caterpillars, small mammals such as mice and ground squirrels, eggs, frogs, fish, snails, mussels, acorns, fruits, nuts, grains	Foxes, bobcats, coyotes, and owls
4♣	Smallmouth Bass	Fish	Crayfish, insect larvae such as hellgrammites, frog eggs, other fish, including minnows	Humans
5♠	Snail	Mollusk	Algae	Important food source for many aquatic organisms
Q♣	Threeridge Mussel	Mollusk	Algae	Some fish, birds and mammals
J♥	Walleye	Fish	Predominantly a fish eater; young walleye will feed on insects and small crustaceans; but will switch to fish- mostly minnows and shad- as they grow	Humans
6♦	Warmouth	Fish	Young feed predominantly upon plankton, small aquatic and terrestrial insects, and snails; adults commonly feed on fish, crayfish, snails, aquatic and terrestrial insects	Many different species of fish, including largemouth bass, smallmouth bass, catfish, musky, pickerel, gar, and bowfin

Stream Ecosystem (Yellow Border)

Streams are classified according to their size and how large the streams are that enter into them. A headwater stream is often envisioned as a trickle from a spring and is classified as a first order stream. When two first order streams join, they become a second order stream. When two second order streams join, they become a third order stream, etc. The biodiversity and abiotic conditions in streams vary greatly from stream to stream and are characterized by the environment in which they are found.

For additional information and classroom activities on *Streams* please refer to the Kentucky Department of Fish and Wildlife Resources *Stream Ecosystem Poster Teacher's Guide @ http://www.kentuckyawake.org/templates/habitatsEcosystems/posters.cfm?instanceID=9698* *Small Stream Ecosystem Poster Teacher's Guide @* http://www.kentuckyawake.org/templates/habitatsEcosystems/posters.cfm?instanceID=9719

	Organism	Class	Feeds On	Eaten By
Q♣	Alligator Snapping Turtle	Reptile	Aquatic plants, invertebrates, small fish, amphibians, frog eggs, other turtles, ducks, geese, small mammals, decaying meat	Eggs are food for skunk, fox, raccoon, mink; hatchlings are eaten by herons, crows, hawks, bullfrogs, large fish, snakes; adults are eaten by humans
6♣	Belted Kingfisher	Bird	Mostly fish, also salamanders, frogs, mollusks, crayfish, lizards, insects, young birds, mice, occasionally berries	Adults are top predators; mammals and snakes feed on eggs and hatchlings; juveniles are vulnerable to predation by raptors
8♣	Bullfrog	Amphibian	Tadpoles eat algae, bacteria and other microorganisms; adults eat insects, spiders, crayfish, other frogs, salamanders, mice, small turtles, fish, small birds, young snakes	Eggs provide food for leeches; adults are food for snakes, herons, raccoons, snapping turtles, otters, mink, large- and smallmouth bass as well as other fish, and humans
5♥	Cope's Gray Treefrog	Amphibian	Larvae feed primarily on algae and various aquatic plants; adults feed on spiders, beetles, butterflies, moths, and other available insects	Fish
4♦	Creek Chub	Fish	Insects, small fish, crayfish, worms, mollusks	Other fishes, such as the smallmouth bass

	Organism	Class	Feeds On	Eaten By
9♠	Dobsonfly	Insect	Adults are not known to feed; hellgrammites eat aquatic invertebrates and small aquatic vertebrates such as fish and tadpoles	Fish, birds, and large invertebrates eat adults; hellgrammites are eaten by fish and large crayfish
J♥	Fingernail Clam	Mollusk	Organic material in water taken in through siphon	Some fish, birds and mammals
7♠	Freshwater Sac Fungi	Fungus	Submerged plant stems, woody substrates and senescent leaves; secrete enzymes to break down the cellulose and pectin of cell walls and absorb stored sugars and starches	Scuds
3♠	Golden Redhorse	Fish	Invertebrates, such as insect larvae; has been known to eat fingernail clams	Humans
10♦	Leech	Worm	Body fluids of host organism; hosts include amphibians, fish, turtles, water birds, and sometimes humans	Fish
6♦	Limpet	Mollusk	Algae, some dead plant material	Some fish, birds and mammals
8♦	Midland Water Snake	Reptile	Small fish, frogs, salamanders, tadpoles, toads	Raccoons, hawks, and other snakes.
4♣	Mink	Mammal	Small mammals such as muskrats, rabbits, and mice; birds, eggs, frogs, snakes, salamanders, worms, insects, crayfish, clams, snails, fish	Bobcat, red fox, gray fox, coyote, and the great horned owl; humans trap for its fur
K♠	Pink Heelsplitter Mussel	Mollusk	Microscopic organisms and organic debris extracted from water, algae	Raccoons and muskrats
5♠	Queen Snake	Reptile	Primarily crayfish that have recently molted, sometimes small fish, frogs, tadpoles, snails, newts	Crayfish prey on young; adults eaten by raccoons, large fish, great blue heron, and larger water snakes.
10♣	Rainbow Darter	Fish	Small invertebrates, such as crustaceans, snails, and insect larvae; fish eggs	Smallmouth bass, large stonerollers, and birds like the great blue heron

	Organism	Class	Feeds On	Eaten By
7♥	Redfin Shiner	Fish	Aquatic and terrestrial insects, other small invertebrates, filamentous algae	Other fish, small mammals
3♥	Six-Spotted Fishing Spider	Spider	Small insects, some tadpoles and small fish	Sometimes eaten by fish
2♣	Snuffbox Mussel	Mollusk	Microscopic organisms and organic debris extracted from water, algae	Raccoons, turtles, otters, minks, muskrats, and some birds
2♦	Southern Leopard Frog	Amphibian	Small invertebrates, mainly insects; tadpoles eat algae, plant tissue, organic debris	Birds, river otters, large fish and other frogs
J♠	Southern Two-Lined Salamander	Amphibian	Small insects and snails	Snakes, birds, mammals
Q♦	Stoneroller	Fish	Microorganisms, algae attached to objects, organic matter that it scrapes off with a unique cartilaginous growth on lower jaw	Larger fish
K♥	Sycamore	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Songbirds, such as the purple finch, and small mammals, such as the beaver, muskrat, and squirrel, eat the seed
9♥	Wood Duck	Bird	Aquatic plants- arrowhead, buttonbush, water smartweed, insects, frogs, crayfish, mollusks	Snapping turtles, bullfrogs, mink, raccoons, largemouth bass, other predatory fishes, humans

Wetland Slough Ecosystem (Green Border)

When most people think of a wetland, they envision a swampy, smelly area with stagnant water flourishing with mosquitoes. However, all aquatic ecosystems, including rivers, ponds, reservoirs, estuaries, swamps, and intermittently wet fields, are considered "wetlands". Each individual wetland is unique in its origin. Wetlands are created by a number of natural phenomena - flooding, rivers changing channels, ancient glaciers, animals, and earthquakes are all examples. Wetlands have a variety of functions and play an important role in the water cycle. In many ways wetlands resemble a sponge and are vital to flood control. Rather than running off, water is absorbed and stored in the wetland during and after a flood, therefore minimizing the devastating effects. As the wetland fills, water is pushed out the bottom, replenishing the underground water table. This process serves as a natural filtration system, removing nutrients, wastes and pollutants from the water.

In North America, the wetland ecosystem is considered to have the highest degree of biodiversity. In fact, the only ecosystem in the world that has more biodiversity than a wetland is the tropical rainforest. The high level of biodiversity is explained by the high level of nutrients and fairly shallow water, which allows a wide variety of plants to grow. More plants lead to more animals and therefore a higher level of biodiversity.

For additional information and classroom activities on *Wetlands*, please refer to the Kentucky Department of Fish and Wildlife Resources *Wetland Slough Ecosystem Poster Teacher's Guide* @ http://www.kentuckyawake.org/templates/habitatsEcosystems/posters.cfm?instanceID=9723

	Organism	Class	Feeds On	Eaten By
4♥	Arrowhead	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Waterfowl (ducks), muskrats
3♦	Beaver	Mammal	Bark, leaves, and twigs of trees, such as birch, willow, cottonwood, poplar, maple, apple, oak; also sedges, rushes, and water plants, such as duckweed, arrowhead, water lily	Kits have many predators including hawks, owls, and otters; coyotes eat adults
9♦	Black Willow	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Honeybees use pollen; deer eat twigs and leaves; rodents eat bark and buds
9♣	Black-Winged Damselfly	Insect	Insects	Naiads are an important food source for fish, frogs, birds, and other aquatic insects; adults are food for birds, frogs and fish

	Organism	Class	Feeds On	Eaten By
Q♥	Bowfin	Fish	Other fish, mostly gizzard shad; crayfish; turtles; frogs; snakes; aquatic insects; young feed on small crustaceans and insects	Bowfin generally are not a prey species, however, large bowfin are predators of smaller bowfin
2♥	Brown Waterscorpion	Insect	Invertebrates, such as water boatmen and dragonfly and damselfly naiads; small aquatic vertebrates, such as minnows and tadpoles	Fish, frogs, and large aquatic invertebrates
2♠	Buttonbush	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Waterfowl eat seeds; flower provides nectar to butterflies, moths; honey plant for bees
5♣	Cardinal Flower	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Provides nectar for butterflies and hummingbirds
8♥	Common Cattail	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Muskrats and wild geese
K♦	Common Spatterdock	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Important food source for a wide variety of wildlife including fish, waterfowl, deer, muskrat, beaver, even porcupine
J♦	Eastern Tiger Swallowtail	Insect	Adults feed on nectar and visit puddles for salt and other minerals; caterpillars feed on leaves of a hardwood trees, including birch, tulip poplar, wild cherry, ash, and others	Caterpillars and adults are fed upon by a variety of predators, especially birds and other arthropods, including spiders and praying mantids
5♦	Golden Shiner	Fish	Tiny floating organisms, or zooplankton, algae, gastropods, snails, insects, fish eggs	Other fish such as bass and crappie; fish, birds, and insect larvae prey on the young
10♥	Green Heron	Bird	Fish, frogs, insects, crustaceans, amphibians, spiders, and leeches	Snakes and raccoons
Q♠	Indiana Bat	Mammal	Primarily moths, mosquitoes and other night flying insects	Foxes, barn owls
6♥	Lea's Bog Lichen	Lichen	Alliance between fungus and alga; alga use sunlight to make sugars or food which feed both the fungus and the alga; fungus create a thallus or body that houses both organisms	Moths, snails, deer, elk

	Organism	Class	Feeds On	Eaten By
10♠	Mosquito	Insect	Male drinks plant juices; female takes blood from birds and mammals, including humans; larva feeds on microscopic algae	Bats and birds eat flying adults; larvae are eaten by fish like the mosquitofish
8♠	Mosquitofish	Fish	Carnivorous with strong, conical teeth. Feed on rotifers, snails, spiders, insect larvae, crustaceans, algae, and fish fry	Larger fish
3♣	Mudpuppy	Amphibian	Worms, crayfish, insects, and small fish	Large fish such as walleye and smallmouth bass, wading birds like the great blue heron or diving ducks, snapping turtles
7♣	Muskrat	Mammal	Cattails and other aquatic plants like arrowhead and buttonbush, occasionally freshwater mussels, snails, crayfish, frogs, fish	Mink, fox, raccoon, river otter, muskellunge, bowfin, large owls, and humans
6♠	Painted Turtle	Reptile	Young eat mostly maggots, earthworms, insect larvae, and beetles; adults eat insects, snails, crayfish, tadpoles, dead animal matter, and plants such as arrowhead	Squirrels, raccoons, skunks, opossum, garter snakes, and foxes prey on the eggs; black racers, bullfrogs, large fish, crows, mink and muskrat feed on young hatchlings
K♣	Predacious Diving Beetle	Insect	Small aquatic vertebrates and invertebrates	Fish, frogs, and other predatory insects, such as dragonfly larvae
7♦	Prothonotary Warbler	Bird	Insects, such as ants, beetles, caterpillars; adult and larval forms of aquatic insects, such as mayflies	Predatory birds, snakes, raccoons, cats
4♠	Red-Winged Blackbird	Bird	Mostly grains and seeds such as water smartweed; will also eat caterpillars, moths, grubs, beetles, mayflies and sometimes fruit	Eagles
J♣	Scud	Crustacean	Plant and animal material, including dead material that they find or small live animals; also graze on algae, fungus, and bacteria attached to underwater rocks and plants	Fish, birds, and amphibians

Wild Cards (Four Color Border)

	Organism	Class	Feeds On	Eaten By
A♥	Algae & Plankton	Plant	Sunlight, nutrients in water, makes own food through photosynthesis	Stonerollers, mayfly nymphs and caddisfly larvae
A♣	Crayfish	Crustacean	Plant and animal material, including small fish	Important food source for many aquatic and terrestrial organisms, including, but not limited to, smallmouth bass, hellbender, bullfrog, snapping turtle, raccoon, mink, great blue heron, belted kingfisher, and humans
A♠	Dead Stuff			
A♣	Red-Eared Slider	Reptile	Young eat insects, crayfish, snails, fish, tadpoles; adults eat aquatic plants, such as arrowhead, duckweed, hyacinths, water lilies	Eggs provide food for raccoons, while otters and great blue herons eat young. Otters and bald eagles eat adults
A♦	Sun			

SECTION 2

GAME INSTRUCTIONS

KENTUCKY QUICK MATCH!

Materials: Kentucky Aquatic Wild Cards (both decks)

Number of Players: up to 10

Rules:

1. The youngest player may be the dealer. The dealer shuffles all the cards together, including the jokers, and then deals out seven cards to each player. The remaining cards form a draw pile that should be placed face down within easy reach of all players.
2. Turn the top card of the draw pile over to form the discard pile.
3. Play proceeds clockwise, starting with the person to the left of the dealer. When it's your turn, place one of your cards on the discard pile. Your card must be from the same ecosystem (i.e. the same color) or be the same type of organism (i.e. mammal for a mammal, plant for a plant) as the top card of the discard pile.
4. Draw a card if you cannot discard. Play the drawn card if you can. If you can't, it's the next person's turn.
5. When playing a wild card, announce an ecosystem when you place the card on the discard pile. The next player must then continue play using that ecosystem. You can play a wild card any time it's your turn and can name any ecosystem you wish.
6. When you play a Joker, the player after you must draw four cards from the draw pile before making her/his play. Announce an ecosystem when you place a Joker card on the discard pile. The next player must then continue play using that ecosystem.
7. When you only have one card remaining in your hand, you must announce "last card" to the other players. If you don't announce "last card", and the other players catch you, you must draw two extra cards from the draw pile.
8. The first player to place all of their cards on the discard pile wins!

PREDATOR PREY

Materials: 1 deck of ***Kentucky's Aquatic Wild Cards***

Number of Players: 2 - 5

Rules: (This game follows the same basic rules as *Go Fish*.)

The Jokers and Wild Cards are not used to play the game "*Predator Prey*".

Shuffle the deck of cards and deal 5 cards to each player. (Cards are dealt one at a time)

The remainder of the deck is placed face down in the middle of the table. The dealer then turns the top card face up next to the deck to make the discard pile.

The player to the left of the dealer (Player 1) begins play.

On their turn, Player 1 will examine the cards in his/her hand and do one of the following:

- Take the card that is face-up and discard one of the cards in their hand or
- Draw a card from the pile and discard a different card from their hand or
- Player 1 will ask another player (player 2) for a specific organism card in order to complete a predator/prey pair. If Player 2 has the card, they must surrender it and Player 1 will lay down the predator/prey pair. If Player 2 does not have the requested card, they respond "Go Wild". Player 1 will then draw a card from the pile completing their turn.

If a player is able to make a predator/prey match, they will lay the cards face up (next to themselves) so all the other players can view them. The player then must draw enough cards from the pile to keep 5 cards in their hand.

The winner of the game is the first person to successfully make 10 predator/prey pairs.

PREDATOR

Materials: 1 deck of ***Kentucky's Aquatic Wild Cards***

Number of Players: 2

Rules: (This game follows the same basic rules as *War*.)

Jokers and Wild Cards are not used when playing the game "*Predator*".

Shuffle the deck of cards and deal them into two equal piles.

Players simultaneously remove the top card from their own pile and drop it onto the table between them.

As the card is released, the players must quickly determine the relationship between the two organisms depicted on the card.

- If both organisms are predators, the game continues.
- If the organisms are both prey of other organisms, play continues.
- If neither player is certain of the relationship, play continues
- If one organism is the prey of the other, the first person to realize it will slap the pile and say "Predator!"

At that time, all the cards in the pile belong to the player who correctly identifies the predator/prey relationship shown on the cards.

Each time a player correctly captures the pile of cards, they will set those aside to be counted at the end of the game.

If cards remain in the pile at the end of the game and no player has won them by identifying a predator/prey relationship, then those cards are not counted by either player.

The player with the most cards wins.

CLASSIFICATION RUMMY

Materials: 1 or 2 decks of ***Kentucky's Aquatic Wild Cards***

Number of Players: 2 - 4

Rules:

Jokers are Wild Cards are not used when playing the game "*Classification Rummy*".

Shuffle the deck of cards and deal 9 cards to each player. (Cards are dealt one at a time)

The remainder of the deck is placed face down as a draw pile.

Turn the top card up to start the discard pile.

The youngest player goes first and play continues to the right.

Players have the choice of taking the card on top of the discard pile or drawing a new card.

During their turn, a player can lay down cards in groups of three.

- To lay down cards, players must have three of the same classification level such as mammals, birds, reptiles, amphibians, fish, insects, crustaceans, or plants.
- Some cards, like bryozoans, will not have three of a kind so players should learn to discard these as part of the strategy.
- When laying down cards, the player must explain to the other players which cards they are laying down and to what classification group they belong.
- An opponent may challenge a classification that they do not believe is correct. For example, the player laid down snapping turtle, queen snake and bullfrog and said they were all reptiles. This is incorrect because the bullfrog is an amphibian.
- If the opponents agree the classification is not correct, the player must put them back into their hand and loses their next turn.

Players discard one card from their hand at the end of their turn.

Play continues until one player lays down all their cards.

The player to lay down all their cards first wins.

ALIMENTO!

"Alimento!" – A fun board game, featuring organisms found in Kentucky's aquatic ecosystems!

Players:
Any number from 2 to 12 that is divisible by 2 or 3 can play (2, 3, 4, 6, 8, 9, 10, or 12). Up to 3 may play individually. More than 3 must be in teams. No more than 3 teams can play.

Equipment:
1 Alimento Game Board
The Purple/Blue deck and the Yellow/Green Deck should both be used (total of 104 cards)
50 Blue Tokens
50 Green Tokens
50 Purple Tokens

When two players/teams are playing, use two different color tokens. When there are three players/teams playing use all three different color tokens.

Object of the Game:
The first player/team to earn 5 points wins the game. A player/team earns points by having connected series of four of the same color tokens in a straight line (either up and down, across or diagonally) on the playing surface. Each completed series earns a player/team one point. You may use any one of the spaces from your first series as part of your second. Players/Teams may earn a bonus point if their series contains a food chain.

A food chain is a pathway for the transfer of energy and materials from one organism to another within an ecosystem. In this game, all food chains must include at least three organisms. One possible food chain in the aquatic ecosystems of Kentucky would be:

Mayfly → Black Crappie → Bald Eagle

In this food chain, the Bald Eagle eats and obtains nutrients from the Black Crappie. The Black Crappie had eaten and obtained nutrients from the Mayfly. Therefore, energy is passed up the food chain, from the Mayfly to the Black Crappie, then from the Black Crappie to the Bald Eagle.

On the beginner's version of the game board (the side with arrows), several possible food chains are labeled. There may be more food chains than the ones labeled. On the advanced version of the game board (the side without arrows), no food chains are labeled; players/teams must discover them on their own. Unlabeled food chains should be agreed upon by majority rule.

Note:
The spaces with logos in the four corners of the game board are free spaces. All players/teams may use them as though their color token is in the corner. When using a corner, only three of your tokens are needed to complete a series. More than one player/team may use the same corner as part of a series.

Preparation:

Place the game board on a flat surface with enough room around the game board for placement of the draw deck of cards, discard pile and extra tokens.

The youngest player deals. The dealer should shuffle the cards and deal out the same number of cards to each player. When playing in teams, each individual team member receives their own cards for play (see table below).

Table for Number of Cards Dealt to Each Player:

For 2 Players – 7 cards each
For 3 Players – 6 cards each
For 4 Players – 6 cards each
For 6 Players – 5 cards each
For 8 Players – 4 cards each
For 9 Players – 4 cards each
For 10 Players – 3 cards each
For 12 Players – 3 cards each

Rules:

Beginning with the player/team to the left of the dealer and moving in a clockwise direction: each player/team selects a card of their choice from their hand and places it face up on the discard pile and then places one of their tokens on the matching card on the game board. Once a token has been placed, it cannot be removed by an opponent except when using a Joker.

When placing a token, you must say the name of the organism and the ecosystem it is found in. Ecosystems are depicted by the border color surrounding the card.

Green –Wetland Slough
Yellow – Stream
Blue – River
Purple - Resevoir

The Wild Cards

There are eight Wild Cards in the card deck. To play a Wild Card, place it on the discard pile and place one of your tokens on any of the open Wild Card spaces on the game board. A Wild Card space is the image of the back of the cards that says "Kentucky Aquatic Wild Cards". This action completes your turn. You cannot place any additional tokens on the game board during this turn. You may play a Wild Card during your turn whenever it works best for your strategy.

The Joker Cards

There are four Jokers Cards in the card deck. The Jokers are humans. Humans can be either beneficial to detrimental to the environment so you can decide if you want to be good or bad. To play a Joker Card, place it on the discard pile and remove an opponent's token from the game board or place a token or your own on any open space on the game board. If you remove a token, you will then replace it with a token of your own. This action completes your turn.

You cannot place any additional tokens on the game board during this turn. You cannot remove a token that is already part of a completed series. Once a series is achieved by a player/team, it cannot be broken.

Dead Card

If you hold a card in your hand that does not have an open space on the game board because the space representing that card is covered by a token, you are holding a dead card. When it is your turn, place the dead card on the discard pile, announce that you are turning in a dead card and take a replacement card (one card per turn). You then proceed to play your normal turn.

Loss of Card

Once you have taken your turn and placed your token on the game board, you must take a card from the draw deck. If you fail to take a card before the next player/team makes a move and takes a card, you lose the right to take a card and you must finish the game with fewer cards than the other players/teams – a disadvantage.

When the draw deck becomes depleted during play, the discard pile is reshuffled to create a new draw deck.

Winning the Game

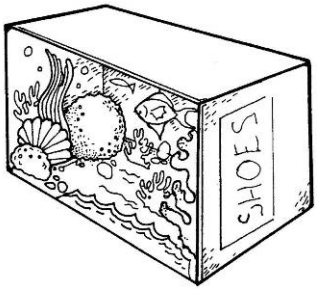
Play continues in a clockwise direction until **a)** one player/team scores 5 points, at which time that player/team wins the game OR **b)** all the available board spaces are covered by tokens, at which time the player/team with the most tokens on the board wins the game.

SECTION 3

CLASSROOM ACTIVITIES

KENTUCKY'S AQUATIC BIO BOX

Create Your Own Bio Box



You will need:
- ❖ Shoebox
- ❖ Art Supplies (paper, scissors, glue, markers, etc.)
- ❖ Pictures of ecosystem organisms (photos or drawings)

Begin by researching an aquatic organism native to Kentucky. Compile your information into a report that you will present in front of the class.

In your report, try to answer the following questions:
- Where what role does your organism play in its food chain?
- What does your organism eat?
- What eats your organism?
- Where and how does your organism obtain food, water and shelter?
- What other organisms live in your organism's ecosystem?
- Is the population of your organism endangered or threatened?
- If so, are there any measures being taken to help this organism?

Create a Bio Box illustrating the information you've collected from your research. Find pictures or create drawings of the important organisms in your organism's ecosystem.

Include the following in your Bio Box
- Your organism
- One predator of your organism
- One prey item of your organism
- At least three other organisms that your organism may encounter in it's habitat
- Sources of water and shelter for your organism.

GOOD BUDDIES

Adapted from the Project WILD K-12 Curriculum and Activity Guide

Objectives

At the end of this lessons, students will be able to:
(1) Define symbiosis, commensalism, mutualism and parasitism.
(2) Identify animals that live in each type of symbiotic relationship.
(3) Describe how symbiotic interactions can be cooperative or competitive.

Method

Students research pairs of animals, play a card game, and classify the pairs of animals according to three major forms of symbiotic relationships.

Materials

- Kentucky Aquatic Wild Cards (selected cards from both versions)
- Chalkboard
- Research materials.

Background

Elements of any ecological system live in an intricate web of interdependence. When two species of organisms live in close association with each other, their relationship is called "symbiotic." In a symbiotic relationship, at least one of the organisms directly benefits from its close association with the other organism. There are three major forms of symbiotic relationships:

Commensalism: a relationship in which one species derives food or shelter from another species without seriously harming that organism or providing any benefits in return

Mutualism: a reciprocal relationship in which the two different species benefit and are dependent upon the relationship

Parasitism: a relationship between two species in which one species (the parasite) nourishes itself to the detriment of the other species (the host)

The major purpose of this activity is for students to become familiar with the concept of symbiosis as one example of interdependence in ecological systems.

Procedure

1. Remove the following cards from your Kentucky Aquatic Wild Cards decks: Longear Sunfish, Giant Floater Mussel, Flathead Catfish, Threeridge Mussel, Freshwater Drum, Pink Heelsplitter Mussel, Red-Winged Blackbird, Common Cattail, Buttonbush, Wood Duck, Logperch, Snuffbox Mussel, Paddlefish, Silver Lamprey, Mosquito, Joker (either one), Cottonwood, Indiana Bat, Lea's Bog Lichen, Silver Maple, Great Blue Heron, Leech, Red-Eared Slider, Sycamore, Barred Owl.

2. Use the information from the first column of the information chart found at the end of the activity to create a list of symbiotic partners. Post the list on the board, a flip chart, or an overhead projector.

3. Distribute one card to each student (do not include Lea's Bog Lichen), and have each student determine his or her "good buddy" according to the posted list.

4. Have the students research the buddy pairs to find out why they are buddies, and then answer the following questions: Why do they live together? What advantages and disadvantages do they provide one another? What would happen if one of the buddies were not there?

5. Have the buddy pairs give short reports describing their relationships.

6. Divide the class into groups of three students, and give each group a selection of cards. Follow these instructions to play "Good Buddies":

   Deal out all cards. Play starts to the left of the dealer and rotates clockwise. Each player draws one card from the player to the left. After the player has drawn a card, that player may lay down all cards in his or her hand that form symbiotic pairs. When a player does not have any cards left, the game is over. The player with the largest number of pairs at the end of the game is the winner. One player is left holding the "Lea's Bog Lichen" card at the end of the game. This person is her/his own "good buddy." Explain how Lea's Bog Lichen is its own "good buddy" by being a mutualistic relationship between fungus and algae. Algae uses sunlight to make sugar that feeds the fungi and algae, while the fungi create a thallus that houses both organisms.

7. To end the activity, discuss the definitions given in the background information for commensalism, mutualism, and parasitism. Go through the list of symbiotic pairs and, as a group, decide to which classification each pair belongs. Ask the group to determine which interactions are cooperative and which are competitive. "Good Buddy" pair members may be called on the help decide the classification. Stress that symbiotic relationships are just one example of the interdependence of all elements of ecological systems.

Evaluation

1. Define symbiosis, commensalism, mutualism, and parasitism.
2. What are two examples of pairs of organisms that have these symbiotic relationships: commensalism, mutualism, and parasitism?
3. Explain how cooperation and competition both exist in nature.

Good Buddy Pairs

Animals	Relationship	Comments
Giant Floater Mussel/ Longear Sunfish	Commensalism	The larval form of the mussel lives on the gills of the sunfish and receives nourishment and transportation from the sunfish. In most cases, the sunfish is not affected.
Flathead Catfish/Threeridge Mussel	Commensalism	The larval form of the mussel lives on the gills of the catfish and receives nourishment and transportation from the catfish. In most cases, the catfish is not affected.
Freshwater Drum/Pink Heelsplitter Mussel	Commensalism	The larval form of the mussel lives on the gills of the drum and receives nourishment and transportation from the drum. In most cases, the drum is not affected.
Common Cattail/ Red-Winged Blackbird	Mutualism	The cattail provides nesting habitat for the blackbird. The organic material left behind by the blackbird becomes nutrients for the cattail.
Buttonbush/Wood Duck	Mutualism	The buttonbush provides nesting habitat for the duck. The organic material left behind by the duck becomes nutrients for the buttonbush.
Logperch/Snuffbox Mussel	Commensalism	The larval form of the mussel lives on the gills of the logperch and receives nourishment and transportation from the logperch. In most cases, the logperch is not affected.
Paddlefish/Silver Lamprey	Parasitism	The lamprey attaches to the paddlefish and sucks its blood, causing harm and possibly death to the paddlefish.
Humans/Mosquito	Parasitism	The mosquito may transmit disease when it attaches to the human and sucks its blood, possibly causing harm or death to the human.
Cottonwood/Indiana Bat	Mutualism	The cottonwood provides a nursery site for bats. The organic material left behind by the bats becomes nutrients for the cottonwood.
Great Blue Heron/Silver Maple	Mutualism	The maple provides nesting habitat for the heron. The organic material left behind by the heron becomes nutrients for the maple.
Leech/Red-Eared Slider	Parasitism	The leech attaches to the turtle and sucks its blood, causing harm and possibly death to the turtle.
Barred Owl/Sycamore	Mutualism	The sycamore provides nesting habitat for the owl. The organic material left behind by the owl becomes nutrients for the sycamore.

ADDITIONAL ACTIVITIES

Suggested Activities from *Project Wild*

- Interview a Spider
- Habitat Rummy
- Wildlife is Everywhere
- Who Fits Here
- Which Niche
- Here Today, Gone Tomorrow
- Litter We Know

Suggested Activities from *Project Wild Aquatic*

- Blue Ribbon Niche
- Fashion of Fish
- Net Gain
- Watershed

Suggested Activities from *Healthy Water Healthy People*

- Benthic Bugs & Bioassessment
- Water Quality Windows

Project Wild is one of the most widely-used conservation and environmental education programs among educators of students in kindergarten through high school. It is based on the premise that young people and educators have a vital interest in learning about our natural world. For more information on **Project Wild** or **Project Wild Aquatic** or to learn how you can register for a workshop, go to ***http://www.projectwild.org/***.

Healthy Water, Healthy People - an innovative water quality education program sponsored by Project WET and the Hach Scientific Foundation, offers hands-on activity guides, testing kits, training, and much more. Healthy Water, Healthy People is for anyone interested in learning and teaching about contemporary water quality education topics. For more information on Healthy Water, Healthy People or to learn how you can register for a workshop, go to ***http://www.healthywater.org/***.

SECTION 4

KENTUCKY CORE CONTENT FOR SCIENCE ASSESSMENT

KENTUCKY CORE CONTENT FOR SCIENCE ASSESSMENT v.4.1

Kentucky Aquatic Wildcard games are meant to be used as a learning tool to help your students better understand scientific concepts. A sample of content standards addressed is below. Playing the games in no means fully covers the content standard, additional teaching is necessary.

Elementary Science

Biological Science

SC-EP-3.4.1 Students will explain the basic needs of organisms

SC-05-3.4.1 Students will describe and compare living systems to understand the complementary nature of structure and function.

SC-EP-3.4.2 Organisms are classified into groups by using various characteristics.

SC-04-3.4.2 Organisms are classified into groups by using various characteristics.

Energy Transformations

SC-EP-4.6.1 Students will describe basic relationships of plants and animals in an ecosystem (food chains).

SC-04-4.6.1 Students will analyze patterns and make generalizations about the basic relationships of plants and animals in an ecosystem (food chain).

SC-EP-4.6.2 Students will describe evidence of the sun providing light and heat to the Earth.

SC-04-4.6.2 Students will use evidence to substantiate the conclusion that the Sun's light and heat are necessary to sustaining life on Earth.

SC-05-4.6.2 Students will understand that the Sun is a major source of energy for changes on Earth's surface.

Interdependence

SC-EP-4.7.1 Students will describe the cause and effect relationships existing between organisms and their environments.

SC-04.4.7.1 Students will make predictions and/or inferences based on patterns of evidence related to the survival and reproductive success or organisms in particular environments.

SC-05-4.7.1 Students will describe and categorize populations of organisms according to the function they serve in an ecosystem.

SC-04-4.7.2 Students will describe human interactions in the environment.

SC-05-4.7.2 Students will understand that a population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

Middle School Science

Energy Transformations

SC-06-4.6.2 Students will describe the effect of the Suns' energy on the Earth system.

SC-07.4.6.4 Students will describe the flow of energy in ecosystems.

SC-08-4.6.4 Students will describe the relationships between organisms and energy flow in ecosystems.

Interdependence

SC-06-4.7.1 Students will describe the consequences of change in one or more abiotic factors on a population within an ecosystem.

SC-07.4.7.1 Students will compare abiotic and biotic factors in an ecosystem in order to explain consequences of change in one or more factors.

SC-08-4.7.1 Students will describe the interrelationships and interdependencies within an ecosystem.

High School

Unity and Diversity

SC-HS-3.4.7 Students will classify organisms into groups based on similarities.

Energy Transformations

SC-HS-4.6.1 Students will explain the relationships and connections between matter, energy, living systems and the physical environment.

SC-HS-4.6-10 Students will identify the components and mechanisms of energy stored and released from food molecules.

Interdependence

SC-HS-4.7.1 Students will analyze relationships and interactions among organisms in ecosystems.

KENTUCKY CORE CONTENT FOR SCIENCE ASSESSMENT v.4.1

Elementary Science

	Quick Match	Predator Prey	Predator	Rummy	Alimento	Bio Box	Good Buddies
EP – 3.4.1			x	x	x	x	x
05 – 3.4.1	x				x	x	
EP – 3.4.2	x	x	x	x	x		
04 – 3.4.2	x	x	x	x	x		x
EP – 4.6.1		x	x		x	x	x
04 – 4.6.1		x	x	x	x	x	
EP – 4.6.2					x		
04 – 4.6.2					x		
05 – 4.6.2					x		
EP – 4.7.1		x	x		x	x	x
04 – 4.7.1		x	x		x	x	x
05 – 4.7.1	x	x	x	x	x	x	x
04 – 4.7.2					x		
05 – 4.7.2					x	x	x

Middle School Science

	Quick Match	Predator Prey	Predator	Rummy	Alimento	Bio Box	Good Buddies
06 – 4.6.2	x				x		
07 – 4.6.4	x	x			x		
08 – 4.6.4		x			x		
06 – 4.7.1						x	
07 – 4.7.1						x	
08 – 4.7.1		x	x		x	x	x

High School Science

	Quick Match	Predator Prey	Predator	Rummy	Alimento	Bio Box	Good Buddies
HS–3.4.7	x	x	x	x	x		
HS–4.6.1		x	x		x	x	
HS–4.6.10		x					
HS–4.7.1		x	x		x	x	x

SECTION 5

RESOURCES

RESOURCES

Internet Resources

WAVE Foundation – *www.wavefoundation.org*

Newport Aquarium – *www.newportaquarium.com*

Kentucky Department of Fish and Wildlife Resources – *www.fw.ky.gov*

Kentucky AWAKE (All Wild About Kentucky's Environment – *www.kentuckyawake.org*

Fish Base – *www.fishbase.org*

Children's Resources:

Butterfield, Moira. Animals in Rivers and Lakes. Austin: Raintree Steck-Vaughn Publishers, 2000.

Cooper, Ann. Around the Pond. Denver: Denver Museum of Natural History Press, 2001.

Kalman, Bobbie and Jacqueline Langille. What are Food Chains and Webs? New York: Crabtree Publishing Company, 1998.

McCormick, Anita Louise. Vanishing Wetlands. San Diego: Lucent Books, Inc., 1995.

Richardson, Adele D. Wetlands. Mankato: Bridgestone Books, 2001.

Silver, Donald M. One Small Square: Pond. New York: W. H. Freeman and Company, 1994.

Silverstein, Alvin, Virginia Silverstein and Laura Silverstein Nunn. Symbiosis. Brookfield: Twenty-First Century Books, 1998.

Stone, Lynn M. Wetlands. Vero Beach: Rourke Enterprises, Inc., 1989.

Taylor, Barbara. Pond Life. New York: Dorling Kindersley, Inc., 1992.

SECTION 6

EVALUATION

EVALUATION

Help us help you. Your comments and suggestions are very important, as they are used to improve and develop future activities and lessons.

1. Where did you receive your set of Kentucky Aquatic Wild Cards and Teacher's Guide from?

2. Which activities/games did you use?
   ❒ Quick Match ❒ Predator Prey ❒ Predator ❒ Rummy ❒ Alimento
   ❒ Bio Box ❒ Good Buddies ❒ Other _____

3. With which grade level(s) did you use this lesson? (check all that apply)
   ❒ K ❒ 1 ❒ 2 ❒ 3 ❒ 4 ❒ 5 ❒ 6 ❒ 7 ❒ 8 ❒ 9-12

4. What did you like best about the teacher's guide and cards?

5. What did you like least about the teacher's guide and cards?

6. Please rate the lessons using the scale below.

	Strongly Agree	Agree	Dis-Agree	Strongly Disagree
The lessons met your expectations	❒	❒	❒	❒
The lessons were well adapted for the age group	❒	❒	❒	❒
The background information was helpful	❒	❒	❒	❒
The activity directions were clear	❒	❒	❒	❒
The activities stimulated my learning	❒	❒	❒	❒
The activities stimulated my students' learning	❒	❒	❒	❒
I would refer this lesson to a colleague	❒	❒	❒	❒

7. On a scale of 1 to 10 (with 10 being the highest), please rate you overall satisfaction with the Kentucky Aquatic Wild Cards and Teacher's Guide.

   1 2 3 4 5 6 7 8 9 10

8. Please tell us your suggestions for improving the teacher's guide.

9. Additional comments: (Please include any additional activities you used/developed using the Kentucky Aquatic Wild Cards)

10. For research purposes only, help us understand who you are.

Your gender? ❒ Male ❒ Female

Your zip code? _____

How many years have you been teaching?

❒ Less than 2 ❒ 3-5 ❒ 5-10 ❒ 11-15 ❒ 16-20 ❒ >20

How many years at you current grade level?

❒ Less than 2 ❒ 3-5 ❒ 5-10 ❒ 11-15 ❒ 16-20 ❒ >20

To be added to our mailing list and receive information about Newport Aquarium's education programs, please print your name and home/school address below.

Name _____ School Name _____

Address _____ Phone Number _____

City/State/Zip_____

E-Mail Address _____

Mail this completed survey to:
ATTN: Education Curator
Newport Aquarium
One Aquarium Way
Newport, KY 41071

OR fax this to:
ATTN: Education Curator
859-261-5888

Please send additional ideas for games or classroom activities to the above address. They will be added to the Teacher's Guide for other teachers to use.

WAVE FOUNDATION at the NEWPORT AQUARIUM
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KENTUCKY DEPT. OF FISH & WILDLIFE RESOURCES

www.wavefoundation.org www.fw.ky.gov