

EXOTICS ARE TAXING OUR ENVIRONMENT

PURPOSE

To recognize environmental changes caused by nonnative plants and animals.

KERA CONNECTIONS to Life Science

Core Content: Organisms and Their Environments

Academic Expectations: 2.2 Patterns, 2.3 Systems, 2.6 Change Over Time

Process Skills: Collecting, Identifying, Predicting

OBJECTIVES

Students should be able to:

1. identify environmental changes that affect wildlife
2. discuss ways that plants and animals increase their range
3. explain how exotic species influence biodiversity.

VOCABULARY

Teachers may wish to discuss the following terms:
eradicate, exotic, hybrid, invasive and native.

aFIELD NOTEBOOK

Ideas for Teachers

- A. Using a 3' x 3' sampling plot, compare the number of native and nonnative plants in the schoolyard. Many ornamental plants and roadside weeds, such as chicory, teasel, Queen Anne's lace, tulips and daffodils, are nonnative. Collect and press plants that are numerous. Research the usefulness or destructiveness of common plants in this ecosystem. Determine the plants' origin and arrival into Kentucky. Create a field guide to the schoolyard or nearby vacant lot.
- B. Discuss different types of seed dispersal. Compare plants, like common milkweed (native) and dandelion (nonnative), that scatter seeds in similar ways. List ways that humans help spread plants. Winter is a relatively insect-free time to walk through abandoned fields. Wear large socks, inside out, over pants or flannel strips and masking tape to collect "hitchhiking" seeds. What invention was inspired by seeds that stick to animals?
- C. **THE BUCK STOPS HERE** - Contact employees in the departments of agriculture and transportation. Find out how their jobs are affected by exotics. How much tax money is spent examining plants and animals at customs? How much tax money is spent on eradicating thistles from roadsides?
- D. Create clue cards, similar to the bluebird and kudzu, describing native and introduced wildlife. On the front of the card, students should draw the organism and write a clue about its range, reproductive ability or relationships with other wildlife. Write the common name of the organism and whether its native or exotic on the back.



Program 6

ANSWERS TO aFIELD NOTES

1. Answers will vary. Kentucky warbler, Kentucky spotted bass, Kentucky coffeetree, Mammoth Cave shrimp and American toad are good candidates.
2. Answers will vary. The foreign places in these names make them easy to spot: English sparrow, European starling, Japanese beetle, Japanese honeysuckle and Canada thistle.
3. Answers will vary, but should reflect overpopulation and competition with native species.
4. Generate specific ideas from the "How do we stop the alien invasion?" list. Follow up the next day. Did students do what they said they would?
5. Plant C is exotic kudzu. The quick growth and lack of involvement with other wildlife species are clues. Kudzu roots help retain soil moisture, replenish nitrogen levels and produce edible food starch. One acre of kudzu can yield 3 1/2 tons of hay suitable for livestock, chickens and human cereal. Its fibrous bark produces mulch and may be woven into cloth. However, kudzu's invasive nature far outweighs these beneficial qualities. Plant A, mapleleaf viburnum, and Animal B, eastern bluebird, are both natives.
6. The unused letters, written in order from top to bottom and left to right, spell out the phrase: **PROTECT BIODIVERSITY!**

Queen Anne's Lace Jelly

CAUTION: As with all wild edible plants, consult an expert and practice identification techniques. Hemlock and snakeroot, both quite poisonous, resemble Queen Anne's Lace.

1. Gather 15 large flower heads and add to 3 ½ cups of boiling water. Allow to steep for fifteen minutes. Strain out plant parts and use the "tea."
2. Add one box of powdered pectin and bring to boil over high heat. Stir constantly.
3. Add 3 ¾ cups of sugar and one tablespoon of lemon juice. Bring to a full, rolling boil for one minute. Continue stirring constantly.
4. Remove from heat. Skim off foam. Pour jelly into sterile jars.

Making Connections

What other exotic plants are used as foodstuffs? Did you know that the KDFWR is also charged with protecting the food supply of the commonwealth?

If you had to raise, catch or grow your own food, what would you eat?

Send individual or class responses to:
Kentucky Afield for Kids
#1 Game Farm Road



Frankfort, KY 40601

E-mail: ntheiss@mail.state.ky.us

E. In the "Eradicate Exotics" puzzle, the organisms are grouped according to disease pathogens, plants, insects, mollusks, fish, birds and mammals. Let students try to name these categories. Explain the use of scientific names. *Duschesnea indica* refers to Duschesnea, while *Hedera helix* is English ivy, *Morus alba* is the mulberry tree and *Poa pratensis* translates into bluegrass.

Tasks for Students

1. Design a plan to prevent more exotics from becoming established in Kentucky. What policies should zoos adopt? How can we encourage nursery owners to sell native plants rather than imported ornamentals?
2. Adopt a section of highway from the Department of Transportation. Construct bluebird houses to hang on fence posts and plant native wild flowers along the easement to reduce mowing.
3. Include a "natives" booth at a school festival or Earth Day celebration. Collect seeds, prepare for germination and distribute in seed packets. Grow the plants in an outdoor classroom or sell as bedding plants.
4. Develop "Least WANTED" posters of harmful, invasive pests. Sketch the exotic plant or animal and include a written description of its "crime." Conduct a mock trial to determine the exotic's fate.

WILD THINGS FOR TEACHERS

Develop an outdoor classroom with the help of the KDFWR. For \$12.00, the *Backyard Wildlife Habitat Kit* offers helpful hints on planning, planting and maintaining a school landscape with native species. Cost-share funding is available to schools that meet criteria under the Backyard Wildlife Program.

RECOMMENDED RESOURCES

- * Lingelbach, Jenepher. "Dandelions" *Hands-On Nature*. Vermont Institute of Natural Science: Woodstock, VT, 1986.
- * Slone, Tim. "Naturalized Import" *Kentucky Afield - The Magazine*. May/Apr. 1996, pp. 2-3.
- * Sole, Jeff. "Out with Fescue" *Kentucky Afield - The Magazine*. May/Apr. 1995, pp. 18-19.

ADDITIONAL ACTIVITIES

- * Project WILD activities "Seed Need" "Who Lives Here?" and "Wild Edible Plants"
- * Project WILD Aquatic activities "Aquatic Roots" and "Water Plant Art"
- * "Native Plants" *Kentucky Afield for Kids*. April 1996.
- * "Your Wild Backyard" *Kentucky Afield for Kids*. May 1997.

EXOTICS ARE TAXING OUR ENVIRONMENT

ALIENS LIVING IN KENTUCKY

Oh no! What can we do? The word “alien” suggests images of space monsters. Foreigners that illegally cross national borders are also called aliens. Aliens are really any strangers or newcomers to an area. **Exotic**, nonnative, non-indigenous and introduced are more adjectives used to describe aliens.

So does E.T. live in Kentucky? Probably not. But Christopher Columbus’ discovery of the New World encouraged travelers from the Old World. New experiences bring fear of the unknown. For support, many settlers brought plants and animals from their native country with them.

Today more than 4,000 exotic plant species and 2,300 nonnative animal species live in the United States. Some increase biodiversity, add to the food supply and contribute to the economy. Cattle, horses, wheat and most people are positive additions to Kentucky. Unfortunately, many other introduced species cause problems.

THE BUCK STOPS HERE - Taxing Our Environment

Citizens pay taxes to fund government activities. To “tax” also means to add a heavy load or burden. Exotic plants and animals become “extras” in the ecosystem. They take up space that natives need to survive. They compete with indigenous species for food, water and cover.

Nonnative species have few native predators. So aliens can reproduce quickly and extend their range. Kudzu, an Oriental vine, was planted on slopes to prevent soil erosion. Kudzu quickly creeps across a field, choking native trees and shading out plant growth. Kudzu and other species like it are called **invasive** exotics.

Some aliens mate with native species. Their offspring may be weak and die quickly. Other offspring are unable to reproduce. Native red wolves have crossed with nonnative coyotes. In this **hybrid**, the quali-

ties of the coyote overpower the qualities of the red wolf. As a separate species, red wolves are now endangered.

Exotics

are responsible for the decline of 42% of U.S. threatened and endangered species. Nonnative insects damage millions of dollars worth of crops and timber. By clogging the water pipes on utility plants, the zebra mussel is expected to cause \$5 billion of damage by 2002. Some



aFIELD NOTES

February 4, 1998

*Before 1492 -
100% native*



*Today -
Exotics take more than
their fair share.*



1. Name five native Kentucky species.

2. Name five nonnative Kentucky species.

3. Explain why one of the nonnative species has a negative effect on the environment.



When they arrived . . .

1600s	Clothes moths arrived with the Pilgrims.
1853	English sparrows released in Brooklyn, N.Y.
1869	Gypsy moth caterpillars escape from Massachusetts laboratory.
1883	Brown trout introduced to North American streams.
1877	Common carp arrives in Boston.
1888	Australian ladybug beetle released in California to control plant fungus.
1890	European starlings released by Acclimatization Societies.
1904	Chestnut blight arrived on trees from the Orient. Within 40 years, nearly all chestnuts dead.
1920	Russian wild hogs escaped from a game preserve in North Carolina.
1957	Striped bass released in Lake Cumberland, Kentucky.
1986	Gypsy moths devour 2.5 million acres of North American forests.
1988	Zebra mussels discovered in the Great Lakes.

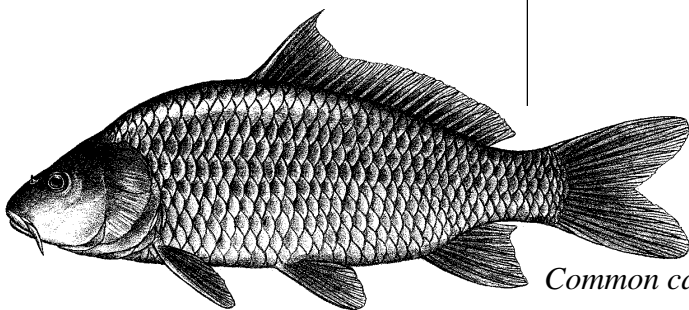
aliens, such as the European pigeon, brown recluse spider and Asian tiger mosquito, spread disease or represent health hazards to people. The government spends millions of dollars trying to **eradicate** exotic pests. Whether introduced to Kentucky intentionally or by accident, exotics are a threat to our biodiversity.

HOW DO WE STOP THE ALIEN INVASION?

We can slow the loss of biodiversity by protecting native species and their ecosystems. We also need to control problem species, identify new pests and prevent more exotics from moving into the state. Here's how you can help:

- * Arm yourself with knowledge. Learn more about harmful exotics. Spread the word to your friends and family.
- * Don't bring plants, fruit, soil or animals into the country. Some animals have hidden in suitcases, hitched rides on airplanes and have been shipped through the mail.
- * Clean boats, boating equipment, camping gear, and boots thoroughly to prevent the spread of pests like zebra mussels. Never release unused fishing bait. Some minnows, shad, crickets and worms are also exotic.
- * Keep pets and ornamental plants where they belong -- in the house. Snails, piranhas and ivy have already caused their share of damage.
- * Volunteer to rid public lands of invasive species.
- * Remember, there is strength in numbers. Plant more native species in your backyard, along roadways and on school grounds.

4. What could you do today to restore native species?



Common carp

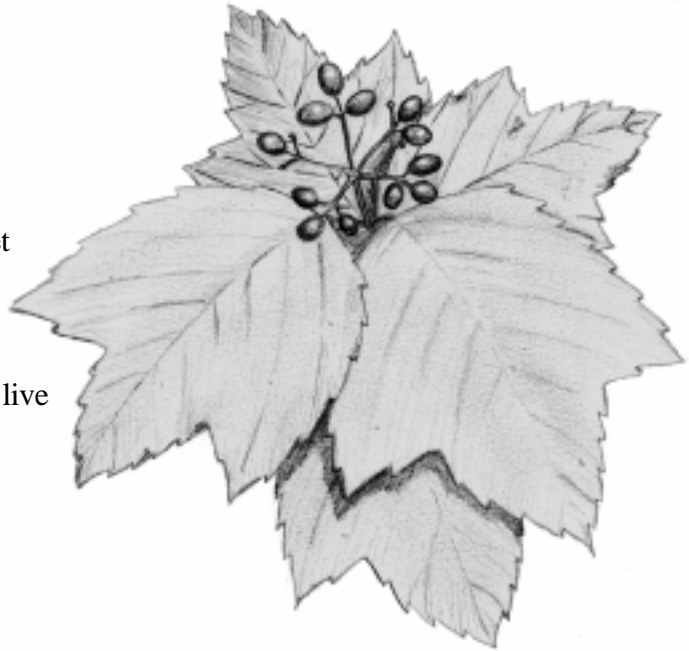
JUST SAY “NO” TO EXOTICS

Exotics come in all shapes and sizes. A few are beneficial. The ring-necked pheasant and the striped bass have increased tourism in some places. However, most are harmful and invasive. Some species change their behavior in new environments. We cannot predict the impact aliens will have on native species. The best practice is to just say “no” to introducing foreign plants and animals to Kentucky.

5. Which one is likely to be exotic?

PLANT A

Slow-growing shrub rarely reaches more than six feet in height. Lives in dry woods with thin soil. Produces hundreds of deep purple berries that are eaten by grouse, deer and rabbits. Forms dense thickets that make ideal cover for small animals. Hardy enough to live in the city smog.



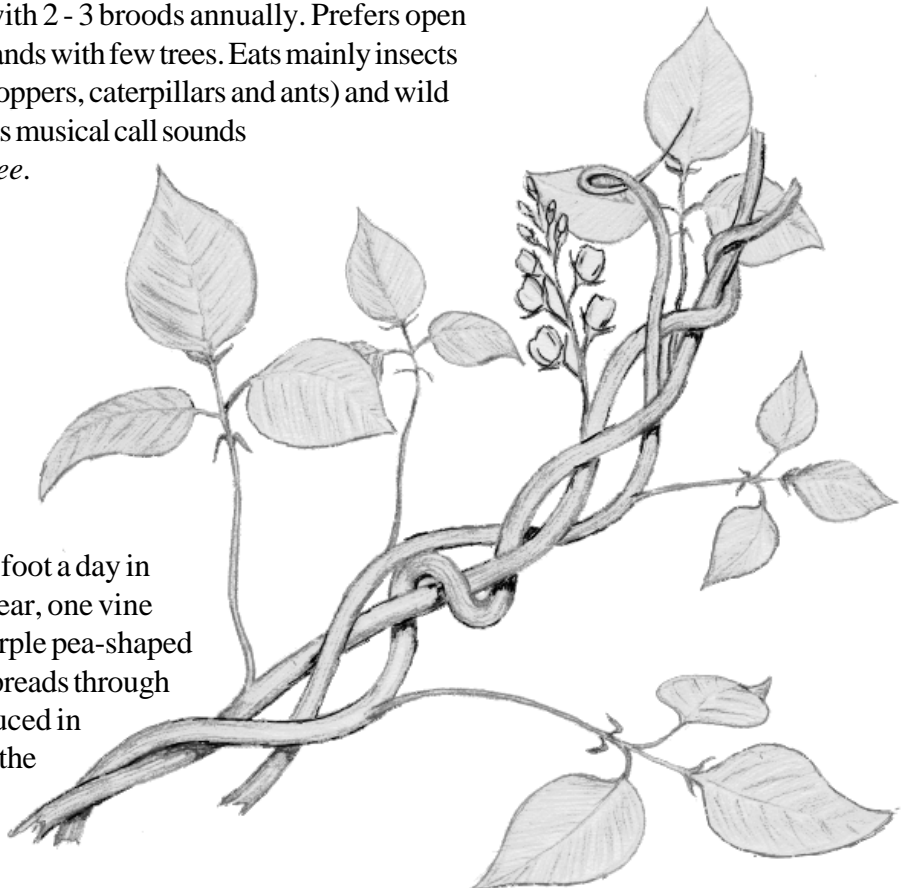
ANIMAL B

Small, sparrow-sized bird that nests in abandoned woodpecker holes. Lays 4 - 6 light blue eggs with 2 - 3 broods annually. Prefers open grasslands with few trees. Eats mainly insects (grasshoppers, caterpillars and ants) and wild fruits. Its musical call sounds like *turee*.



PLANT C

Perennial, woody vine can grow up to one foot a day in good soil and weather. At the end of one year, one vine commonly reaches a length of 100 feet. Purple pea-shaped flowers smell like Concord grapes. Plant spreads through root or leaf starts and by many seeds produced in large hairy pods. Roots replace nitrogen in the soil and prevent erosion.



ERADICATE EXOTICS

Weed out these nonnative species found in Kentucky. Highlight the CAPITALIZED part of their names. They can be found vertically, horizontally, diagonally and backwards in the puzzle. The remaining unhighlighted letters will spell out a message on how you can make the Kentucky better for people and wildlife.

dutch **ELM** disease

burning **BUSH**

canada **THISTLE**

broad-leaved **DOCK**

DUSCHESNEA indica

ground **IVY**

hedera **HELIX**

japanese **HONEYSUCKLE**

johnson **GRASS**

KUDZU

morus **ALBA**

mulberry **WEED**

multiflora **ROSE**

OSAGE orange

queen anne's **LACE**

POA pratensis

european **PRIVET**

TREE OF HEAVEN

wild **ONION**

brown dog **TICK**

CRAZY ANT

european **HORNET**

gypsy **MOTH**

harlequin **BUG**

hog **LOUSE**

honey **BEE**

horn **FLY**

horse **BOT** fly

house **FLY**

japanese **BEETLE**

juniper **SCALE**

mimosa **WEB** worm

varroa **MITE**

ZEBRA MUSSEL

asiatic **CLAM**

brown **TROUT**

common **CARP**

REDBREAST SUNFISH

house **FINCH**

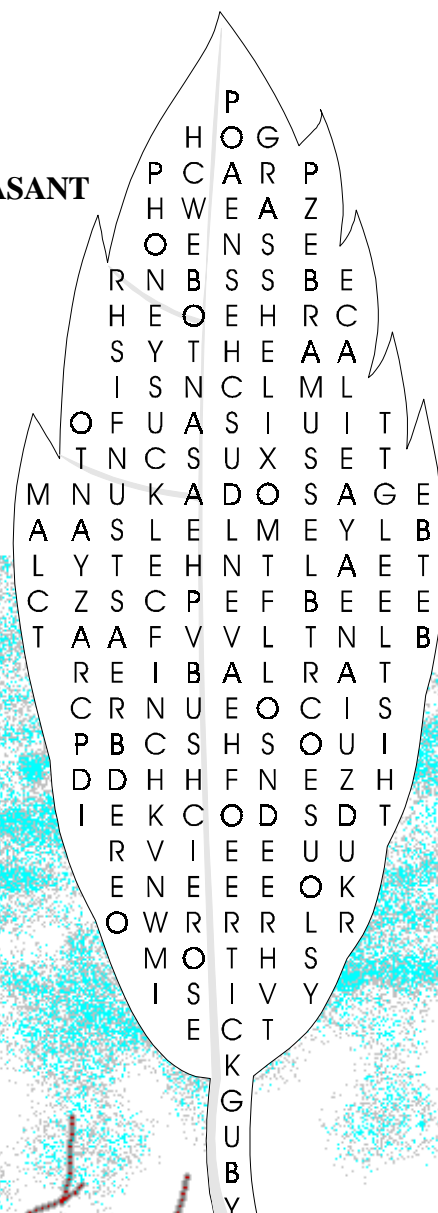
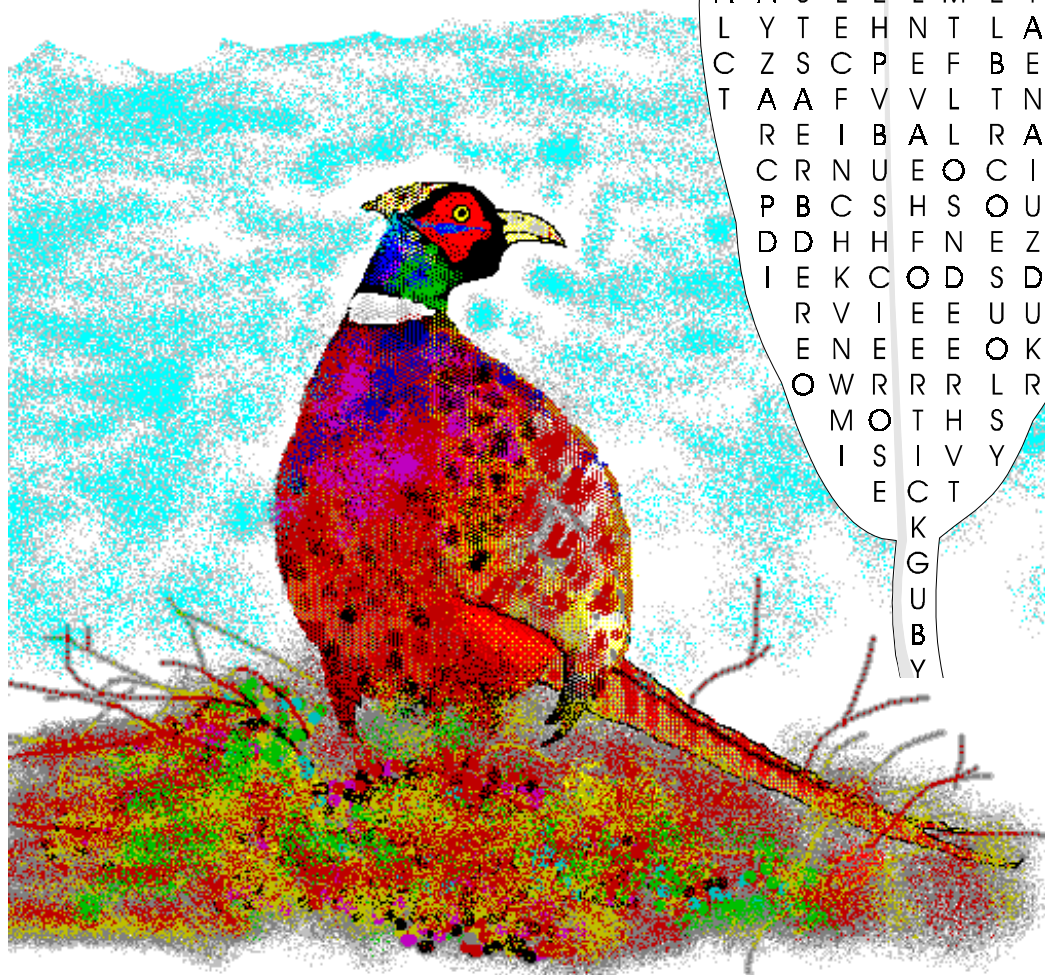
ring-necked **PHEASANT**

fallow **DEER**

norway **RAT**

russian wild **HOG**

6. _____ !



This pheasant puzzle was created by Kris Grimes, a senior at Anderson County High School. Kris enjoys hunting and fishing as well as playing baseball and basketball. Send us your poems, drawings and puzzles for use in future Kentucky Afield projects. Mail to: Kentucky Afield for Kids, #1 Game Farm Road, Frankfort, KY 40601.