TO CATCH A PIG

Grade 5

Lesson at a Glance
Students play an outdoor game that stresses the difficulty of removing feral animals from native ecosystems. Students then create illustrated essays to summarize what they have learned.

Key Concept
Management of isolated or fragmented habitats requires feral animal control and prevention of new introductions of non-native species.

Objectives
Students will be able to:
1) discuss the importance of feral animal control in Hawai‘i;
2) write an essay describing problems related to feral pigs and possible means of controlling them; and
3) ***mālama*** (care for) the environment.

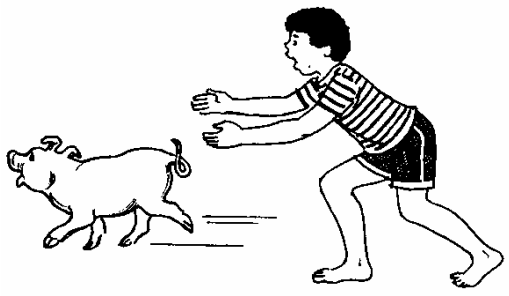
Science/Mālama i ka ‘āina, Conservation of Resources: Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions. Performance Standards: the student examines and explains why there is a need to conserve natural resources.

Social Studies/Environment and Society: Students demonstrate stewardship of earth’s resources through the understanding of society and the physical environment. Benchmarks: Analyze the consequences of human modification of the physical environment in Hawai‘i, the United States and/or other parts of the world and implement a plan of action to address the consequences. Performance Standards:

The student:
- Identifies effects of human activity on the physical environment (regions).
- Assesses the positive and negative consequences on the environment under study.
- Devises, carries out and evaluates a plan to address the negative consequences.

Time
two to three class periods

Subject Areas
science, social studies, physical education, language arts, Hawaiian studies



Materials
plant cards (provided)
30 small sponges
2 rolls of green surveyor’s tape
1 roll of red surveyor’s tape or crepe paper
4 rolls of masking tape
a few cardboard boxes

a box of rubber bands
"We All Need the Forest," ʻŌhiʻa Project video or use photos depicting a healthy forest and one that has pig damage

Preparation
Make five sets of the plant cards and cut them out. The pictures should be on one side and the descriptions should be on the flip side.

Prerequisites
"Alien Invaders!" Humans and the Environment, Grade 5
"Leaf It Alone," Plants and Animals, Grade 5 (suggested)

Teacher Background

Since many **native** habitats in Hawaiʻi are small or fragmented, they are especially vulnerable to disturbances. The introduction of non-native plants and animals to these **habitats** can be particularly destructive. When their habitats are disturbed, native species are often threatened with **extinction**. When introduced species outgrow the **ecosystem**, dominate or over compete with natives, cause serious environmental and economic harm, they are referred to as **invasive**. Management policies to save native species can be most effective if an entire native habitat is protected.

There are many ways to manage natural areas, including planting trees for **timber**, restoring native species or stocking rivers for fishing. However, when the management objective is saving native habitats, the removal of invasive **feral** animals such as pigs, goats, sheep and cattle is of utmost importance. Feral pigs are a major problem in native forests. Scientists have estimated that 80,000 pigs are roaming Hawaiian forests and only a maximum of 10,000 are removed by hunters each year. This does not bode well for the future, as some estimates suggest that hunters would need to kill 70 percent of all pigs each year just to keep the population at its present level.

Pigs destroy a forest **understory** by knocking over plants and rooting for worms in the soil. They leave muddied, fertilized openings that introduced weed species may easily invade. Water collecting in the mud provides a breeding ground for mosquitoes, known to transmit **avian malaria** to native birds. Mosquitoes can also transmit dengue fever, a virus that can be fatal to humans. The exposed soil combines with pigs' feces to pollute streams, making "fresh" mountain water dangerous for drinking or swimming. During heavy rains, these polluted streams flow out to sea and damage reef ecosystems by smothering them with sediment. Without our forests, we lose our watersheds.

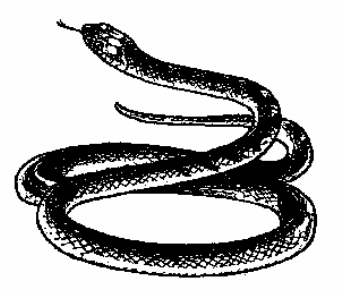
Despite the well-documented evidence of feral animal destruction, many people, especially hunters looking for recreation, do not want feral animals taken out of wilderness areas. Hunters are often unable to hunt in more remote areas, where feral animals continue to multiply. Environmentalists and sportsmen often hold different views about habitat management and the issue remains unresolved after many decades. A possible compromise between hunters and environmentalists would be to leave a population of feral animals in an already damaged forest and fence the animals out of adjacent healthy native forests. Hunters are often hired to remove feral animals, and fences have been built around **reserves** to prevent new animals from entering. Fence construction and maintenance in Hawaiian forests can be difficult and costly, however,

especially in remote mountainous areas where the cost of fencing can range from $3,100–$43,000 per km ($5,000–$70,000 per mi). As time goes by, the cost of fencing will increase.

Feral pigs, cattle and goats are not the only destructive introductions. Smaller predatory animals, such as cats, dogs, rats, birds and mongooses, may also cause tremendous damage. Escaped songbirds often carry diseases to which native birds have no immunity. Plants, such as strawberry guava, banana poka, miconia, or clidemia (Koster's curse) invade native forests and replace less competitive native plants.

Many non-native species were deliberately introduced years ago to serve some useful or ornamental purpose. Now that scientists are more aware of the negative impact that foreign plants and animals may have on native ecosystems, officials limit the introduction of new species. People who bring in or receive any plant, insect, microorganism (i.e., plant diseases), or non-domestic animal into Hawai'i must notify the Hawai'i Department of Agriculture's Plant Quarantine Branch and have the items available for inspection. Dogs, cats, and other carnivorous animals must undergo quarantine for 120 days. Plants are declared at the airport. If the plants are on the noxious plant list, they will be confiscated. Still, not all new species are barred, and people do manage to illegally bring in new species that could damage native ecosystems. Public education may prove to be a significant deterrent to further introductions. Here is a partial list of some animals that private individuals may not import into Hawai'i.

- earthworms
- ferrets
- gerbils
- hamsters
- honey bees
- lizards
- rabbits
- raccoons
- skunks
- snakes
- snapping turtles
- squirrels
- tarantulas
- toads



Across the country and throughout the world, ecosystems are under attack by invasive species. For instance, the Burmese python, native to southeast Asia, can be found in the Florida Everglades. It was brought in through the international pet trade legally. Eventually people discovered that the snake makes a lousy pet. As a result, some unhappy pet owners dumped their snakes into the Everglades. The snake is one of the largest in the world and can be a formidable foe even for resident alligators. The snake competes with natives, such as the threatened eastern indigo snake, for food. Then there's human safety to worry about! The brown tree snake, a venomous native to the Solomon Islands and Australia, made its way to Guam as a stowaway on planes during World War II. On Guam it is responsible for power outages and the loss of much of the native birds and bats. It has attacked sleeping children. It has no natural enemies on Guam. Many species of plants and animals are endangered or threatened because of invasive species. The control and eradication of invasives costs millions of dollars and is damaging to economies everywhere. In the United States alone, the costs run into the billions.

Teaching Suggestions

1) Review "Alien Invasion" with the class from the perspective habitat management. Divide management into two broad categories: preventing further introductions and managing unwelcome species that have already become established. In the second student reading,

could the townspeople have prevented the introduction of more monsters? How does the story compare to the situation of introductions in Hawai‘i?

2) Show the ‘Ōhi‘a Project video, “We All Need the Forest,” or use photos that show photos of a healthy forest and one that depicts pig damage. Discuss ways that feral animals, especially pigs, damage native forest and ways of controlling these animals (hunting, trapping, or fencing). Explain the difficulty and expense of managing native habitats.

3) Distribute the plant cards and ask each student to color one and attach it to a sponge with rubber bands. If desired, have students make simple pig-nose masks.

4) Play “To Catch a Pig.” See game instructions provided.

5) Conclude with a discussion of the game.

   Discussion Questions
   - In what ways does the game reflect the real world? In what ways is it different?
   - Who pays for the hunters and fence builders? (the government or private conservation organizations—ironically, some of the money collected from hunting licenses also goes to fence building)
   - What if no one wants to pay to maintain the fences? (The quality of the reserve declines.)
   - Why is it important to remove all pigs and not just a few from the reserve? (They reproduce so quickly.)
   - Will fences keep cats, rats, and other pests out of nature reserves? (no)
   - What other ways could pest species be controlled in Hawai‘i? (traps, poisons, biological controls)
   - Why is feral animal control important in Hawai‘i? (to protect watersheds and native habitat)

6) Ask students to write a short essay describing reasons to control invasive feral pigs, methods of control, and difficulties involved. Encourage students to illustrate their essays with pictures of mountain reserves, fences, pigs, hunters, reserve managers, plants and other animals.

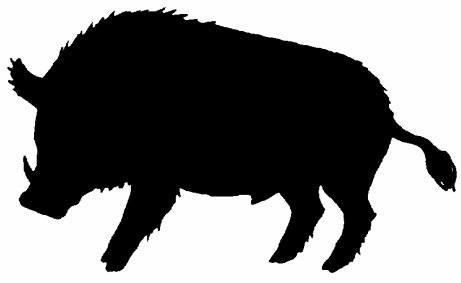
Extended Activities

- Ask a representative from The Nature Conservancy of Hawai‘i or the National Park Service on Maui or Hawai‘i to visit the class and discuss feral animal control.

- Arrange to visit a state Natural Area Reserve or part of a national park that is fenced and compare the area within the reserve with the area outside. Learn about the species protected within the reserve. Suggested sites are listed in the Field Sites Appendix.

Objectives

- fence builders: to keep the fence repaired
- hunters: to remove pigs from the reserve
- pigs: to find and "remove" native plants



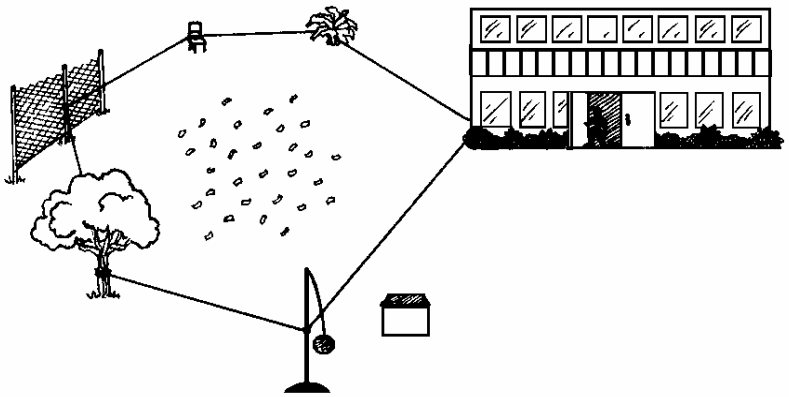
Players
4 fence builders
4 hunters
18 pigs

Game Set-up

- Give strips of red tape to the hunters and green tape to the fence builders to wear as headbands for identification. Appoint yourself the reserve manager and wear a badge if you wish.
- Take the class outside to an open grassy area. Help the fence builders build a green surveyor's tape "fence" around an area about twice the size of a classroom. The fence can be tied to poles, buildings, trees, chairs or other structures. Ideally, there should be about six fence sections (sides) to the reserve—more than the number of fence builders.
- Ask students to "plant" their native species in the reserve by randomly placing their sponges on the ground.
- Identify a spot outside the reserve as the pig pen, and place a cardboard box in the spot.
- Supply each of the fence builders with a roll of masking tape, and give one of them extra surveyor's tape.

How to Play

1) The reserve manager begins the game by allowing two fence builders, four or five pigs (outside the reserve) and two hunters (inside) to start playing. This will allow students to grasp the rules before the game becomes chaotic. After a few minutes, declare that the pigs have had piglets, and allow the rest of the fence builders, pigs and hunters to join the game.



Pigs

2) Pigs break through the fence, enter the reserve, snatch one native species, and place it in the cardboard box in the pig pen. Pigs can only enter or leave through openings in the fence and cannot break through a section of the fence that fence builders are currently working on. Pigs can continue indefinitely unless they are tagged in the reserve by a hunter.

3) When a pig is tagged, the reserve manager must take a native species from the pig pen, replant, and leave the reserve before the game can resume.

4) The tagged pig may continue playing unless there are no native species in the pig pen, in which case s/he must sit out the game. The reserve manager will call when its time to move again.

Hunters

5) Hunters stay inside the reserve and tag pigs that enter. Hunters are not allowed to tag pigs outside the fence.

6) Once a pig has been tagged, the hunter must shout "PIG!" to freeze the game.

Fence Builders

7) Fence builders maintain the fence around the reserve by tying or taping it together, or by stringing up a new fence section. A fence is any length of surveyor's tape attached between two points.

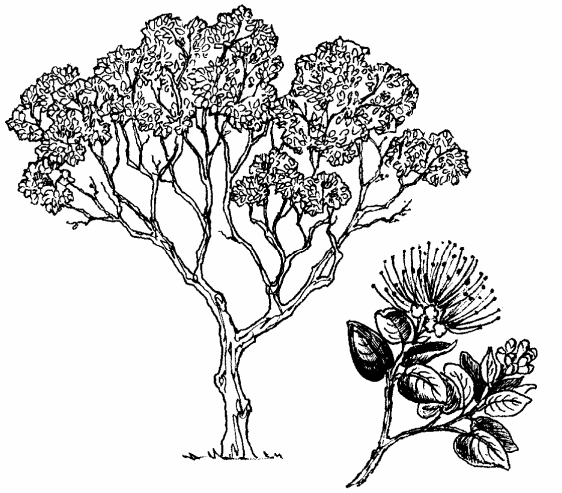
8) Fence builders may not station themselves at a fence section unless they are repairing it.

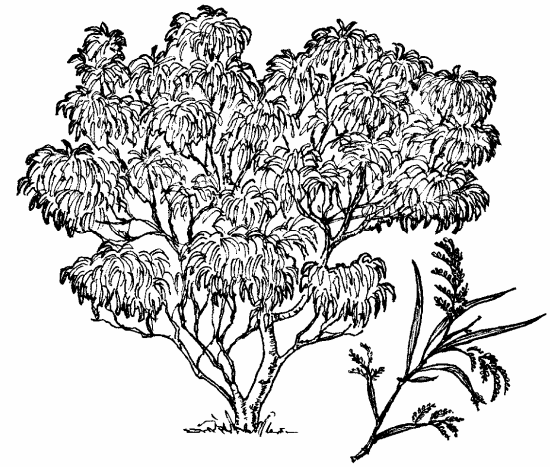
To End the Game

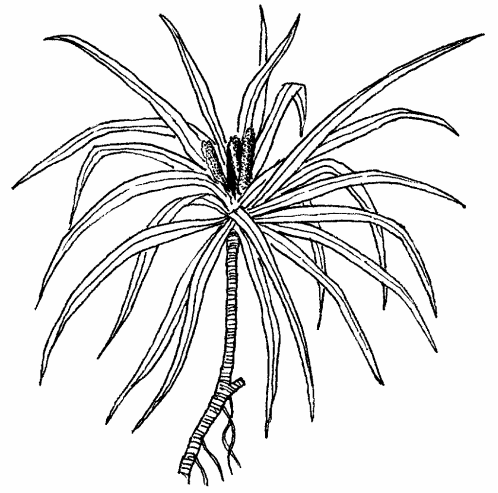
Play the game long enough for the students to get an idea of how difficult it is to protect native habitats from feral animals, or until all the pigs are "out" or all native species are removed.

Variations

Alter the balance of the game by removing funding for fence maintenance (eliminating fence builders), or making it more difficult for hunters to move about in the forest by tying their feet together or tying one arm behind their backs. Add another factor by having a group of children break a hole in the fence to get to a swimming hole.







Koa (*Acacia koa*)
Endemic

Koa is the Hawaiian word for warrior. Hawaiians carved the straight trunks of this giant tree into sturdy outrigger canoes.

description: 15–40 m (50–140 ft) tall and up to 4 m (12 ft) in diameter. "Leaves" on mature trees are crescent-shaped, flattened leaf stems. True leaves are finely divided.

habitat: dry and medium wet forests from 460–1,800 m (1,500–6,000 ft) elevation. *Koa* are found on all the main Hawaiian Islands.

ʻŌhiʻa lehua (*Metrosideros polymorpha*)
Endemic

The first tree to grow on new lava flows, *ʻōhiʻa lehua* is the most common native tree in the islands. Its blossoms are said to be sacred to the volcano goddess Pele.

description: dark green leaves vary from round to narrow, smooth to hairy. Flowers are pink, yellow, white, peach and most commonly red. Ranges in size from a small 30-cm (1-ft) shrub to a 30-m (100-ft) tree.

habitat: from sea level to 2,700 m (9,000 ft). The largest trees are in areas of high rainfall.

ʻĀkala (*Rubus hawaiiensis*)
Endemic

This native shrub is also known as Hawaiian raspberry. Unlike other raspberry plants, *ʻākala* generally has no thorns or only soft thorns that are easily removed.

description: 1.5–4 m (5–15 ft). Pink flowers bear large tasty red or yellow fruits.

habitat: rainforests above 1,200 m (4,000 ft). Rare except on Kauaʻi, Maui, and Hawaiʻi.

ʻIeʻie, climbing pandanus
Endemic
(*Freycinetia arborea*)

Hawaiians used the strong, aerial roots for fish traps, baskets, and helmets. The moist areas between the leaves and stems are home to an amazing community of native animals, including herbivores, carnivores and scavengers.

description: a tree-climbing plant with long leaves and an orange-gold flowering spike.

habitat: from 300–1,200 m (1,000–4,000 ft) elevation in wet forests.

Naio, false sandalwood Endemic
(*Myoporum sandwicense*)

The hardwood of this native tree has a scent like sandalwood.

description: shrub or tree with narrow leaves 6–
15 cm (2–6 in) long. Small pink or white flowers bear white fruit with very hard seeds.

habitat: dry coastal areas to subalpine shrublands.

Hāpuʻu, Hawaiian tree fern
Endemic
(*Cibotium splendens*)

The downy covering of the new fronds (*pulu*) was used as a wound dressing and was once collected and exported for pillow stuffing.

description: up to 5 m (16 ft) tall. Bright green fronds are 1–3 m (3–9 ft) long. *Pulu* is golden.

habitat: understory of rainforests.