

Lesson at a Glance:

Students read and discuss a story of how voyaging canoe crews prevented *no-no* flies from entering Hawai‘i. Groups of students then become invaders and inspectors in a game to discover more about the most *unwanted species**.

Key Concepts:

Introduced pests invade the islands via aircraft, ships, private boats, mail, and by people releasing their pets. Some introductions are purposeful, others are accidental. There are a number of actions individuals can take to help stop the invasion of introduced pests and to prevent the spread of established pest species.

Objectives:

Students will be able to:

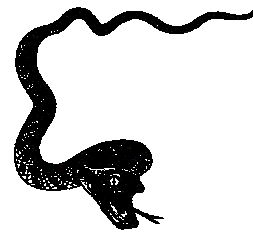
- 1) identify some of the most threatening pests that could invade Hawai‘i;
- 2) describe ways that threatening species could invade the islands, how pests could spread, and

Time:

two–three class periods.

Subject Areas: science, language arts, social studies.

- Materials:**
- *The Silent Invasion* booklet (optional)
 - *Unwanted Cards* (provided)
 - six letter-size envelopes.



Preparation: Make a copy of the *Unwanted Card* pages for each student (or group of students if you wish to save paper) and one extra set for the game. Cut out a set of the first six cards (which excludes the termite, *no-no*'s and *Miconia*) for the game and place each of these *Unwanted*s in a separate envelope. Mark each envelope, "HANDLE WITH CARE, CONTAINS AN UNWANTED!" Make a copy of the student reading for each student.

Teacher Background: As the hub of the Pacific, Hawai‘i is the primary shipping link between the U.S. Mainland, Asia, and other Pacific ports. The Honolulu International Airport is one of the busiest airports in the world. With the multitude of arriving ships, private boats, passenger flights, and military transports come many opportunities for plants, animals, and tiny microbes to invade the islands. State and federal inspectors are limited by personnel and budget constraints and cannot inspect the thousands of parcels that arrive in Hawai‘i each day. Since Hawai‘i heavily relies on self-reporting and voluntary inspection, people need to be much more aware of the threat of alien species.

*Nine alien pests have been targeted as the "most unwanted" in a publication, *The Silent Invasion*, produced by the Coordinating Group on Alien Pest Species, 1986. Only one, *Miconia*, has arrived and poses a major threat to island forests.

What do inspectors find coming into the islands?

In a one-year period, state inspectors from the Plant Quarantine Branch, Department of Agriculture, intercepted illegal plant materials from airline baggage, cargo, and incoming mail. Here is a breakdown of the number of times illegal plant materials were intercepted:

Fruits and vegetables	267
Insect infested plants.....	28
Noxious weeds, cut flowers, branches, and coconut products.....	243
Ornamental plants	130

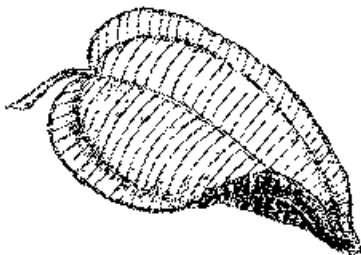
Recently, federal and state inspectors also intercepted insects and other invertebrates on 2,275 occasions during a one-year period. Of these, at least 259 species were not known to live in the islands. Following is a breakdown of where animal species were intercepted:


Ship cargo	16%
Air cargo	39%
Passenger flight baggage	40%
Mailed parcels & other sources	5%

Some of these species were brought in intentionally by people trying to evade the law; others were mailed or brought in innocently by people who were not aware of the threats to the islands' economy or environment. Since nearly 80% of these intercepted species arrived via aircraft, it is essential that visitors and residents be informed of the prohibitions against bringing in plants, animals, or soil to the islands. Additional inspectors are also needed to efficiently inspect all incoming aircraft.

Which species pose the greatest threat to Hawai'i? Nine species have been identified as the most *Unwanted* in the islands:

Species	Threat
Brown tree snakes.....	slightly venomous—inflict bites on humans; cause power outages; decimated Guam's native birds.
Biting sand flies, midges.....	can inflict thousands of bites per person, per day.
Human malaria-carrying mosquitoes.....	transmit malaria to humans
Queensland fruit flies.....	breed in a variety of crops, limiting crop export to major markets
<i>Miconia</i>	Tree invades native rainforest, spreads and shades out native plants; has invaded 70% of Tahiti's native rainforest and occurs on Big Island, Maui, O'ahu, and Kaua'i.



Species 	Threat
Fire ants.....	Toxic stings harm humans and beneficial farm insects; damages crops; can kill ground-nesting birds.
Africanized honey bees (“killer bees”).....	Aggressive attacks on humans can cause death; competes with native bees that pollinate Hawaiian
Any new termite.....	Damage to homes and businesses; high cost for treatment and repair.
Piranhas.....	Fish inflicts dangerous wounds on humans and other large animals.

See the *Unwanted Cards* provided with this activity for more information about each species.

How can we stop the invasion? Increasing public awareness about the most threatening pests to watch out for, how to report them to authorities, and how to prevent their introduction is critical to the future well-being of our island economy and environment. The story of the near-introduction of the *no-no* fly provided with this activity illustrates how informed people can make a difference by preventing unwanted pests in the islands. If the crews of *Hawai‘iloa*, *Hōkūle‘a*, and the other canoes had not been aware of the threat posed by these flies, we would probably be suffering on our beaches today. The 10-point list on the *Stop the Alien Invasion* handout is designed to spread the word about what individuals can do to stop the invasion.



Teaching Suggestions

- 1) Distribute the story of the *no-no* flies for students to read.
- 2) After reading the story, discuss students' reactions. If you have a copy of *The Silent Invasion* booklet, show students the photo of the person's arm covered with *no-no* bites

Discussion Questions:

- What prevented the *no-no* flies from reaching Hawai‘i?
 - Why do we want to keep the *no-no* flies out of Hawai‘i?
 - How might the presence of *no-no* flies affect our health? Our economy?
 - What is the most likely way that *no-no* flies could reach our islands?
 - What could you do to help keep *no-no's* out of Hawai‘i?
 - How would your lifestyle change if *no-no's* invaded Hawai‘i?
 - What other kinds of plants or animals do you think are or should be on the “unwanted” list? Why?
- 3) To learn more about the other unwanted species, play *The Invasion Game*. See page 5 for game instructions.
 - 4) After the first round of the game is completed, ask students to switch roles and have inspectors become invaders. Distribute three new *Unwanted Cards* to the invaders.
 - 5) When all students have had an opportunity to play both roles, ask them to summarize what they have learned.

Summary Questions:

- If these alien pest species successfully invaded the islands, how might it affect you?
 - Which species do you think poses the greatest threat? Why?
 - If the species became established, what could be done to keep it from spreading?
 - Do you think it is important to keep new alien species out of Hawai‘i? Why?
- 6) Distribute a set of *Unwanted Cards* to each student or group of students. Introduce the unwanted species that has already invaded—*Miconia*. Have students look carefully at the picture and talk about how to identify this invader. If students think they see this plant, instruct them to call their island hotline number listed on the *Miconia Unwanted Card*.
 - 7) Review the *Stop the Alien Invasion* handout and ask students to circle each action that they could take.
 - 8) As a homework assignment, ask students to take home a card or cards and share them with their families and friends. Ask them to select one unwanted species and write a hypothetical news article describing how it invaded, the problems it is causing, and what is being done to prevent its spread.

Extended Activities

- Encourage students to help remove alien pests like *Miconia*. Check with your local State Department of Agriculture, Department of Land and Natural Resources, or the Sierra Club for volunteer opportunities.
- Have students make *Unwanted* posters for each species and place the posters in a prominent place in your school, at the local library, or nearby shopping center.
- Students could create booklets from sets of *Unwanted Cards* and loan them to other classes in the school.
- Create life-size *Miconia* leaves with large sheets of purple and green construction paper. Have students draw the veins on the leaves and hang them around the classroom as reminders to watch out for this invader.
- Invent an invader out of craft materials. Ask students to invent an invader that could invade your island. This new species should be well equipped to hide in cargo, get past sniffing dogs or slip past inspectors.

Before the Game:

- Divide the class into six teams. Three teams are invaders and three are inspectors. After the first round of the game, teams will switch roles.
- Place a line of chairs in the center of a cleared area of the classroom and have inspectors sit as teams. The chairs will represent the Hawaiian Islands.
- When you are ready to play, pair up each inspector team with an invader team. Have the invader team stand opposite the inspector team, about 10 ft (3 m) away from the chairs that represent the islands.
- Give each invader team one *Unwanted Card* in an envelope and tell them to keep the identity of their species a secret.

Invaders: Each team of invaders should read the information on the *Unwanted Card* and come up with six general clues to give to inspectors who are trying to determine their identity. They should make their clues accurate, but difficult since they are trying to conceal their identity. Invaders should then rank order their clues from the most general to the most specific, in the order they will give them out to the inspectors.

For example: *I could reach the islands on a boat or jet. No one has ever figured out a way to get rid of me. I could hurt your tourist industry. I'm small, but I can bite. I could spread by breeding in beach sand, moist soil or in streams. I can fly.* (Identity: no-no or biting sand fly)

During the game the invaders will advance toward the islands when:

- The inspector team guesses their identity incorrectly (*one step forward*).
- They give a clue to the inspector team (*one step forward*).
- The inspector team can't tell how to prevent their invasion (*invade!*).
- They answer **no** to an inspector team's question (*one step forward*).

Inspectors: Each team of inspectors should write six questions to ask invaders about their identity. They should not receive any *Unwanted Cards*. Invaders can only answer questions with **yes** or **no** responses.

For example: Do you have a backbone? Are you an insect? Inspectors' identification of invaders should be considered correct if they guess "snake" or "fruit fly" or other general answers.

During the game:

- The inspectors may ask one question of their invader team at a time.
- They may also request a clue with each turn, but they should keep in mind that the invaders move one step forward with each clue they give.

To play the game: Go over the *objective* and the *game rules*.

Objective: To discover who the main pest threats are, how they are invading, and to learn what can be done to prevent their introduction.

To win the game: There can be multiple winners in the game.

- For invader teams to win, they must keep their identities concealed from the inspectors and they must physically reach the islands.
- For inspector teams to win, they must discover who an invader is and describe one way to prevent it from invading.

Start: Ask an inspector team to begin by asking one question of their invader team. After they receive a *yes* or *no* response, the team can ask for a clue from the invaders. Proceed by taking turns with each inspector team asking one question of its invader team. The game continues until all inspector teams have asked six questions and tried to guess the identities of their invaders.

Game Rules:

- Invaders must provide a clue when asked.
- Each time the invaders provide a clue, they may take one step toward the islands.
- Inspectors may try to guess the identity of their invader team at any time.
- If the inspector team guesses the invader's identity incorrectly, the invaders can take one step toward the islands.
- If the inspector team guesses the invader team's identity correctly, they have one minute to come up with a way of preventing the invasion.

For example: *We could help keep the flies out of the islands by teaching more people about unwanted pests and not sending certain types of fruit to the islands.*

If the inspector team completes this task, they are declared a winning team.

- If the inspector team does not come up with a way to prevent the invasion, the invader team moves to the islands and wins.
- Inspector teams may not repeat another team's method of preventing an invasion.
- If inspectors do not guess the invader's identity in six trials, they can ask for clues until all six clues are given out.

When the game is over, discuss what happens in reality if the invader team "wins." In this scenario, we all lose since the invaders have such a negative impact on our lives.

