

# STOP THE INVASION

GRADES 7-8

Lesson at a Glance: Students create a public awareness campaign about the threat of invasive alien species and what people can do to report sightings of pests and prevent accidental introductions.

Key Concepts: Invasive pest species cause millions of dollars in crop damage, pose a threat to human health and safety, and impact native species and tourism. People need to learn what pests to watch out for, how to report them to authorities, and how to avoid accidentally introducing them to or spreading them between the islands.

Objectives: Students will be able to:

1. Identify some of the most threatening pests that could invade Hawai‘i.
2. Describe the impact invasive alien species could have on agriculture, native species, human health and safety, and tourism.
3. Design creative ways to teach others about alien species and what can be done to stop the invasion.

Time: three–five class periods

Subject Areas: science, social studies, language arts

Materials:

- alien species *Unwanted Cards* (provided)
- *Stop the Alien Invasion* handout (provided)
- craft supplies for students’ campaign

Preparation: Make a set of alien species *Unwanted Cards* and the *Stop the Alien Invasion* handout for each student and an extra set for the first part of the activity.

Teacher Background:

The silent invasion of Hawai‘i by insects, disease organisms, snakes, weeds, and other pests is the single greatest threat to Hawai‘i’s economy and natural environment and to the health and lifestyle of Hawai‘i’s people.

—*The Silent Invasion* by the Coordinating Group on  
Alien Pest Species (CGAPS)\*

\*CGAPS Members: State agencies: Dept. of Agriculture, Dept. of Health, Dept. of Land and Natural Resources, Dept. of Transportation, Farm Bureau Federation, Hawai‘i Visitors and Convention Bureau, and The Nature Conservancy of Hawaii. Federal agencies: U.S. Customs Service, Dept. of Agriculture, U.S. Fish & Wildlife Service, National Park Service, U.S. Navy, Postal Inspection Service and U.S. Postal Service.

Impact on economy: Why does the Coordinating Group on Alien Pest Species consider the silent invasion of alien pests as the single greatest threat to the economy and natural environment of Hawai‘i? Pest species arrive in the islands without the natural controls to their populations, such as parasites, diseases or predators, which are found in their country of origin. Without these controls, many species spread and cause major damage to crops and native ecosystems. Many invasive species are already taking a toll on agriculture and others pose major threats to farmers if they were to arrive in Hawai‘i. Additionally, the potential invasion of harmful snakes, biting insects and tropical diseases poses a major threat to the visitor industry which drives the economy of Hawai‘i.

Agriculture: Agriculture is the third largest source of income of Hawai‘i. Farmers are already battling a number of pest species that damage their crops and the threat of new pests is a major concern. Following are some examples of the impact of pest species on agriculture:

- The invasive *kalo* root aphid causes 90 percent crop loss in dryland *kalo*. The only treatment is to remove all *kalo* from an infested field for at least one year.
- Another alien root aphid is attacking cabbage, broccoli, and cauliflower crops on Maui causing crop losses of 20–90 percent.
- Non-native fruit flies present on papaya, mango, and other fruits are limiting the export of these fruits to major markets like Japan and California. The loss of these markets to the farmers of Hawai‘i is approximately \$300 million per year.
- Anthurium growers are battling bacterial blight, an introduced disease that has caused a 40 percent decline in this crop since 1980.

Tourism: The visitor industry is largely dependent on the islands’ image as a paradise that is free of snakes, many tropical diseases, and harmful insects. Some of the most "unwanted" species that could threaten tourism are:

- *No-no* flies. Some *no-no* flies breed in beach sand; others breed in streams. At their peak, swarms of flies can inflict thousands of bites per person per day. Crews on the *Hawai‘iloa* and *Hōkūle‘a* discovered and destroyed these flies on their canoes while en route to Hawai‘i from the Marquesas. These voracious biting flies on the beaches of Hawai‘i could have a devastating impact on tourism.
- Fire ants and killer bees are not part of the fauna of Hawai‘i, but their presence on the Mainland U.S. poses a very real threat to Hawai‘i. Fire ants were intercepted in a package arriving at the Honolulu post office from Florida in 1991. Fire ants and killer bees cause allergic reactions in humans that sometimes result in death.

Impact on native species: Invasive alien pests are the number one threat to the survival of unique native plants and animals of Hawai‘i. Some non-native species spread into native ecosystems where they prey upon or compete with native species, destroy habitat and/or spread foreign diseases. Controlling the spread of these pests, repairing the damage they cause, and preventing new introductions is a costly and time-consuming effort for state, federal, and private nature reserve managers.

Why are reserve managers putting so much effort into controlling or removing alien pests? There is a sense of urgency to protect what remains of the native ecosystems of Hawai‘i because so many unique plants and animals that are found nowhere else in the world are endangered here. The islands are home to 38 percent of the nation’s threatened and endangered plants and 41 percent of the endangered birds. Damage to the islands’ forested watersheds also has a direct impact on our fresh water supply. Following are some examples of the impact of invasive alien pests on native species:

- More than 2,000 alien invertebrates are now established in the islands. Non-native species have invaded almost all habitats from sea level to the top of Mauna Kea. Some of these invaders feed directly on native plants, others spread diseases or compete with native invertebrates.
- On Haleakalā, the Argentine ant, which arrived in Hawaii in 1940, is wiping out native bees and other pollinators of the spectacular native *‘āhinahina* (silversword).
- Non-native pigs, goats, deer and sheep have invaded most watershed forests in the state. They destroy vegetation, including understory plants, which accelerates soil erosion into stream and reef ecosystems. These animals also pollute streams with their feces and diseases.
- Miconia, a very aggressive Latin American plant that was introduced to the islands as an ornamental, can spread in wet areas and destroy native rainforests. Approximately 70 percent of Tahiti’s native rainforest has been taken over by miconia. Volunteer groups on the Big Island, Maui, O‘ahu, and Kaua‘i are actively trying to destroy this invader.
- Brown tree snakes, which invaded Guam after World War II, have already wiped out 9 of Guam’s 11 native bird species. Brown tree snakes have been intercepted in Hawai‘i on incoming aircraft from Guam on at least seven occasions.
- Nearly 1,000 native plant species (89 endemic) are found in Hawai‘i. People have introduced approximately 4,600 plants to the islands! Of these introductions, 800 plant species have become naturalized and more than 80 of these are serious pests.
- One invasive plant, banana poka, which was introduced to the Big Island before 1921, now covers 70,000–97,000 acres on the Big Island, Maui and Kaua‘i. This invader smothers native trees with its dense vines and completely changes the structure and composition of native forests.

Impact on health and lifestyles: A number of invasive alien species pose threats to human health and lifestyles:

- There are no human malaria-carrying mosquitoes in Hawai‘i. If these mosquitoes (*Anopheles* species) do become established in the islands, people would require malaria shots or pills. Control of the disease could be extremely difficult as these mosquitoes spread more rapidly than most mosquitoes.
- Fire ants and killer bees have toxic stings that produce allergic reactions and in some cases, death, in humans. If they reach the islands, it would limit the areas where people could enjoy the outdoors. Killer bees reached southern California in 1995.

- Piranhas have been confiscated in Hawai‘i on a number of occasions. These aggressive biting fish inflict deep wounds and their presence would make swimming in freshwater ponds and streams a potentially dangerous experience.
- Brown tree snakes bite humans (they are slightly venomous) and they eat songbirds, chickens, puppies, and kittens.

How can we stop the invasion?

Some of the invasive pest species in Hawai‘i were brought in intentionally by people trying to evade the law; others were mailed or brought in innocently by people who are not aware of the threats to the islands’ economy, environment or human health. Since Hawai‘i relies heavily on self-reporting and voluntary inspection, people need to be much more aware of the prohibitions against bringing in plants, animals, or soil to the islands and the threat posed by alien species.

Additional inspectors are also needed to efficiently inspect all incoming aircraft. 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.

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 health, island economy and environment. The 10-point list on the *Stop the Alien Invasion* handout is designed to spread the word about what individuals can do.

### Teaching Suggestions

#### Part 1: How Do Alien Species Affect Me?

1. Come into class with a small suitcase full of alien species cards. Explain that you are carrying nine species that pose a serious threat to Hawai‘i. Ask students if they know of any alien species that would have a negative impact on their lives and to explain why these species are a threat. Challenge them to come up with four major ways that alien species have an impact on our lives.
2. List students’ ideas on the board and either list the four major areas or help students group their responses in four major areas: *economy, health, lifestyles and native species*. List these four areas in large “boxes” on the board (see page 6).
3. Divide the class into nine groups. Have group members assume various roles such as a traveler, a journalist to record information, and an investigative reporter to share the group’s information. Have a representative from each group reach into the suitcase and remove an alien species card. Each group should keep the identity of its card from the other groups.
4. Have students in groups read the information on their cards and, on a separate sheet of paper, list potential impacts under the four main categories.

5. Ask one team to list the potential impacts of its alien species under each category on the chart. Then have their classmates use this information to guess the identity of the team's alien species. If needed, students can provide their classmates with clues.
6. Once the invasive alien is identified, have students discuss where the species would have the most impact on the economy, health, lifestyles or native species. Students will see that these effects are interrelated. Ask them to draw lines connecting the "boxes" to demonstrate these interrelationships. Then tape the alien species card to the "box" where they believe the impact will be greatest.
7. Add a fifth "box" labeled *Prevention* to the board. Discuss ways the invader could be prevented from arriving and/or spreading in the islands and list students' ideas. Explain that these alien species are not "bad" plants and animals. However, in Hawai'i they would be out of place and could spread out of control throughout the islands.
8. Repeat the process with each team adding its information to the "boxes" and their classmates trying to guess their species' identity.

#### Part 2: How Can We Stop the Invasion?

9. Brainstorm ideas of what can be done first. Explain that lack of public awareness is one of the major factors that needs to be addressed if we are to stop the invasion of alien species. Distribute a *Stop the Alien Invasion* handout to each student and discuss ways that individuals can help.
10. Ask each group to develop a way to share information about its alien species with other classes in the school or with students in other schools. They should include why the invasive alien could be a problem, what people can do to prevent the invasion and how to report alien pests to authorities. Students may design visuals, develop skits, computer presentations, video segments, riddles or pantomimes. They could also record public service announcements for broadcast in your school.
11. Have students launch a public awareness campaign using each group's presentation as part of the effort.

#### Extended Activities

- If your school has a web page, have students add information and images of the invasive aliens onto the site. Or have students create news bulletins to be shared via the DOE's electronic newsletter. These could include a bulletin about being an inspector of one's own luggage. When students travel, they could inspect their family's luggage to be sure there are no seeds on or in such things as socks, shoes or camping gear.
- Students could volunteer to help remove miconia or other alien plants from natural areas. Contact your local State Department of Agriculture, Department of Land and Natural Resources, or the Sierra Club to find out how you can help.
- Have students draft sample legislation to address the problem of the introduction of alien species. For example, legislation could be drafted for the State Department of Transportation to allocate a percentage of airport landing fees to increase the number of inspectors for incoming flights. Students could send or present their draft legislation to their representatives.