

*Activity #1*

# Introducing Invasives

**Length:**

One class period (may be preceded and followed by homework)

**Prerequisite Activity:**

Rain Forest Module Unit 3 Activity #2 “Adaptive Radiation in Rain Forest Birds” is helpful but not necessary; it may be completed after this activity for enrichment.

**Objectives:**

- Develop a basic vocabulary of invasive species concepts and terms.
- Gain a “big picture” understanding of invasive threats to native biodiversity.

**Vocabulary:**

Adaptive radiation	Endemic	Miconia
Biodiversity	Eradicate	Native
Biological control	Evolution	Naturalize
Canoe plants	Feral	Natural Resource Management
Containment	Globalization	Ungulate
Ecosystem	Invasive	
Endangered	Isolation	

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**●●● In Advance:**

- Depending on your students’ reading comprehension level, you can assign the Student Page “From Isolation to Globalization” as homework, or present the slideshow in class.
- Rain Forest Module Unit 3 Activity #2 “Adaptive Radiation in Rain Forest Birds” is helpful but not necessary; it may be completed afterwards for enrichment.

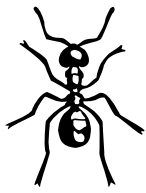
**●●● Class Period One: *Defining Native, Nonnative, and Invasive***

**Materials & Setup**

- “From Isolation to Globalization” slideshow included on the DVD and available for download at [www.hoikecurriculum.org](http://www.hoikecurriculum.org)
- “Species Glossary” on the DVD

*For each student*

- Student Pages “From Isolation to Globalization” (pp. 9-13)
- Student Page “Invasive Species Crossword” (pp. 14-15)



## Instructions

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- 1) Ask students to list on a piece of paper as many examples of native Hawaiian plants and animals as they can think of.
- 2) Discuss the definitions of native (including endemic and indigenous species), and non-native (including canoe plants, introduced, and invasive species) using Teacher Background Page “Definitions” (pp. 3-6) as guidance.
- 3) Have students read their lists in turn, writing “N” for native, “C” for canoe plant or animal, and “I” for introduced beside each item. The student with the most unique “N” listings can win a prize. Use the “Species Glossary” on the DVD included with this curriculum as a reference.

Note: If you aren’t sure which heading a particular species falls under, you can assign finding the answer to students for homework.

- 4) Present the slideshow “From Isolation to Globalization” and/or have the students the read Student Pages “From Isolation to Globalization” (pp 9-13). Spend the remainder of the class discussing the slideshow and/or reading. As vocabulary words are read, have students write the definitions down. Tell them that they will need these to complete the “Invasive Species Crossword.”

- 5) Assign the Student Page “Invasive Species Crossword” (pp. 14-15) in class or as homework.

Note: All the answers are included in boldface type in the slideshow script and the reading assignment.

- 6) Once they’ve completed the lesson, have students revisit their list and add as many native (N), canoe (C), introduced (I), and invasive (IN) species as they can.

## Journal Ideas

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- What did you learn about plants and animals you thought were native?
- Pick five of the vocabulary words from the reading and write a paragraph using all five.
- Pretend you are a seed or spore just blown in on the wind from far away. Write a story detailing your origin, your journey, and how you adapted (over millennia) to the new environment in which you found yourself.

## Assessment Tools

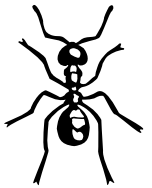
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- Participation in class discussion
- Student Page “Invasive Species Crossword”
- Student’s list of native, canoe, introduced, and invasive species
- Journal entries

## Further Enrichment

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- Show the students the film, *Miconia Threatens Maui*, included in this curriculum on the DVD and available to view at [www.hoikecurriculum.org](http://www.hoikecurriculum.org).



Teacher Background

**Definitions**

The following is a list of species categorized as NATIVE (both indigenous and endemic) (N), CANOE (C), INTRODUCED (I) or INVASIVE (IN). Consult the “Species Glossary” on the DVD for a comprehensive, alphabetized list of species that includes photos; scientific, common, and Hawaiian names; and native, non-native, and invasive status.

**NATIVE (N): a species that arrived or evolved in an area without the assistance of humans.** Native includes both indigenous and endemic species.

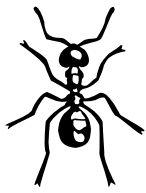
**Indigenous: native to an area but not unique to that area.** (Note: Outside of Hawaii, indigenous is generally considered a synonym for “native”.)

**Plant examples:**

English	Hawaiian	Latin
beach morning glory	<i>pōhuehue</i>	<i>Ipomoea pes-caprae</i> subsp. <i>Brasiliensis</i>
false sandalwood	<i>naio</i>	<i>Myoporum sandwicense</i>
pandanus	<i>hala</i>	<i>Pandanus tectorius</i>
staghorn fern	<i>uluhe</i>	<i>Dicranopteris linearis</i>
	<i>a‘ali‘i</i>	<i>Dodonaea viscosa</i>
	<i>‘ilima</i>	<i>Sida fallax</i>
	<i>pūkiawe</i>	<i>Leptecophylla tameiameia</i>
	<i>naupaka kahakai</i>	<i>Scaevola sericea</i>

**Animal examples:**

English	Hawaiian	Latin
frigate bird	<i>‘iwa</i>	<i>Fregata minor</i>
green sea turtle	<i>honu</i>	<i>Chelonia mydas</i>
humpback whale	<i>koholā</i>	<i>Megaptera novaeangliae</i>
Pacific golden plover	<i>kōlea</i>	<i>Pluvialis fulva</i>
spinner dolphin	<i>nai‘a</i>	<i>Stenella longirostris</i>



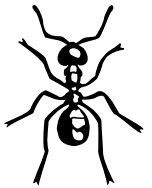
**Endemic: unique to an area; native to no other place on earth.**

**Plant examples:**

English	Hawaiian	Latin
Hawaiian dodder	<i>kauna 'oa</i>	<i>Cuscuta sandwichiana</i>
Hawaiian poppy	<i>pua kala</i>	<i>Argemone glauca</i>
Hawaiian raspberry	<i>'ākala</i>	<i>Rubus hawaiiensis</i>
Hawaiian tree fern	<i>hāpu 'u</i>	<i>Cibotium glaucum</i>
lobelia		<i>Lobelia gloria-montis</i>
sandalwood	<i>'iliahi</i>	<i>Santalum haleakalae</i>
silversword	<i>'āhinahina</i>	<i>Argyroxiphium sandwicense</i>
	<i>koa</i>	<i>Acacia koa</i>
	<i>māmāne</i>	<i>Sophora chrysophylla</i>
	<i>'ōhelo</i>	<i>Vaccinium reticulatum</i>
	<i>'ōhi 'a</i>	<i>Metrosideros polymorpha</i>

**Animal examples:**

English	Hawaiian	Latin
Crested honeycreeper	<i>'ākohekohe</i>	<i>Palmeria dolei</i>
Hawaiian duck	<i>koloa</i>	<i>Anas wyvilliana</i>
Hawaiian goose	<i>nēnē</i>	<i>Branta sandvicensis</i>
Hawaiian hoary bat	<i>'ōpe 'ape 'a</i>	<i>Lasiurus cinereus semotus</i>
Hawaiian monk seal	<i>'īlio holoholo i ka uaua</i>	<i>Monachus schauinslandi</i>
Hawaiian petrel	<i>'ua 'u</i>	<i>Pterodroma sandwichensis</i>
Hawaiian stilt	<i>ae 'o</i>	<i>Himantopus mexicanus knudseni</i>
Maui parrotbill	<i>kiwikiu</i>	<i>Pseudonestor xanthophrys</i>
Short-eared owl	<i>pueo</i>	<i>Asio flammeus sandwichensis</i>
	<i>'apapane</i>	<i>Himatione sanguinea</i>
	<i>'i 'iwi</i>	<i>Vestiaria coccinea</i>



**CANOE (C): Polynesian introductions brought to Hawai‘i by the first human settlers.**

**Plant examples:**

English	Hawaiian	Latin
banana	<i>mai‘a</i>	<i>Musa spp.</i>
breadfruit	<i>‘ulu</i>	<i>Artocarpus altilis</i>
candlenut	<i>kukui</i>	<i>Aleurites moluccana</i>
coconut palm	<i>niu</i>	<i>Cocos nucifera</i>
kava	<i>‘awa</i>	<i>Piper methysticum</i>
shampoo ginger	<i>‘awapuhi kuahiwi</i>	<i>Zingiber zerumbet Sm.</i>
sweet potato	<i>‘uala</i>	<i>Ipomoea batatas</i>
taro	<i>kalo</i>	<i>Colocasia esculenta</i>
ti	<i>ki</i>	<i>Cordyline fruticosa</i>

**Animal examples:**

English	Hawaiian	Latin
Polynesian rat	<i>‘iole</i>	<i>Rattus exulans</i>
Polynesian pig	<i>pua‘a</i>	<i>Sus scrofa</i>
chicken	<i>moa</i>	<i>Gallus gallus domesticus</i>
dog	<i>‘ilio</i>	<i>Canis lupus familiaris</i>
gecko	<i>mo‘o</i>	<i>Hemidactylus frenatus</i>

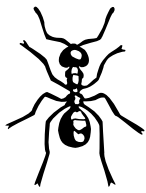
**INTRODUCED (I): a species that does not originate from the particular area where it is observed.** Synonyms: alien, exotic, introduced.

**Plant examples:**

English	Hawaiian	Latin
avocado		<i>Persea americana</i>
bird of paradise		<i>Strelitzia reginae</i>
mango		<i>Mangifera indica</i>
pineapple		<i>Ananas comosus</i>
plumeria		<i>Plumeria spp.</i>
ten cent flower	<i>pua kenikeni</i>	<i>Fagraea berteroa</i>

**Animal examples:**

English	Hawaiian	Latin
wallaby		<i>Petrogale penicillata</i>



## Activity #1

### Invasive Species Unit 1

**INVASIVE (IN):** a nonnative species that directly preys upon or outcompetes native species for resources. (Note: even though these species are invasive problems in Hawai'i, some have been here long enough to gain Hawaiian names.)

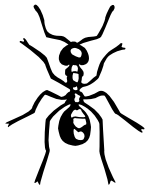
Plant examples:

English	Hawaiian	Latin
banana poka		<i>Passiflora mollissima</i>
fireweed		<i>Senecio madagascariensis</i>
fountain grass		<i>Pennisetum setaceum</i>
gorilla ogo		<i>Gracilaria salicornia</i>
kahili ginger	<i>kāhili</i>	<i>Hedychium gardnerianum</i>
miconia		<i>Miconia calvescens</i>
pampas grass		<i>Cortaderia jubata/selloana</i>
red hook seaweed		<i>Hypnea musciformi</i>
strawberry guava	<i>waiawī</i>	<i>Psidium cattleianum</i>
giant salvinia		<i>Salvinia molesta</i>

Animal examples:

English	Hawaiian	Latin
veiled chameleon		<i>Chamaeleo calytratus</i>
coqui frog		<i>Eleutherodactylus coqui</i>
goat		<i>Capra aegagrus hircus</i>
little fire ant		<i>Wasmannia auropunctata</i>
mosquito		<i>Culex</i> spp.
Norway rat		<i>Rattus norvegicus</i>





*Teacher Version*

## **Invasive Species Crossword Answers**

1. Isolation: the condition of being solitary, remote, not subject to frequent introductions of new species
2. Introduced: a non-native plant or animal species
3. Adaptive radiation: the rapid development of many species from a single ancestral population (two words)
4. Evolution: genetic changes occurring in a population over time
5. Containment: a resource management strategy for keeping an established pest from spreading to new areas
6. Eradicate: to completely eliminate
7. Globalization: the development of an increasingly integrated global economy marked especially by greater international travel and exchange of goods
8. Native: a species that arrived or evolved in an area without the influence of humans
9. Indigenous: native to an area
10. Biodiversity: the various species of plants and animals in an environment
11. Endemic: unique to a particular area; native to no other place on earth  
Biological control: a method of mitigating the effects of an invasive species by releasing a natural predator from the species' native range into the environment
12. Feral: escaped from domestication and living in the wild, usually applied to animals
13. Endangered: in immediate danger of becoming extinct
14. Naturalize: to begin reproducing in the wild; said of non-native species that are becoming established
15. Ecosystem: a community of living organisms and the nonliving environment they occupy
16. Ungulate: hoofed mammal
17. Miconia: a fast-growing tree with large leaves, native to Central and South America; one of the worst invasive species in Hawai'i
18. Invasive: a non-native species that directly prey upon or outcompete native species for resources
19. Biological control: a method of mitigating the effects of an invasive species by releasing a natural predator from the species' native range into the environment it has invaded (two words)
20. Canoe plants: plants brought with the Polynesian wayfarers, also called Polynesian introductions (two words)